



# ***ESP-100i***

## **PLASMA CUTTING PACKAGES**



## **INSTRUCTION MANUAL**

P/N 33530 - 200 V, 208 V, 230 V, 380 V, 415 V, 460 V, 575 V, 3-Phase, 50/60 Hz  
Starting with Serial No. POR1537026, October, 1995

**BE SURE THIS INFORMATION REACHES THE OPERATOR.  
YOU CAN GET EXTRA COPIES THROUGH YOUR SUPPLIER.**

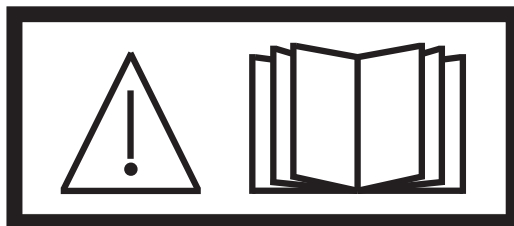
## **CAUTION**

These INSTRUCTIONS are for experienced operators. If you are not fully familiar with the principles of operation and safe practices for arc welding and cutting equipment, we urge you to read our booklet, "Precautions and Safe Practices for Arc Welding, Cutting, and Gouging," Form 52-529. Do NOT permit untrained persons to install, operate, or maintain this equipment. Do NOT attempt to install or operate this equipment until you have read and fully understand these instructions. If you do not fully understand these instructions, contact your supplier for further information. Be sure to read the Safety Precautions before installing or operating this equipment.

## **USER RESPONSIBILITY**

This equipment will perform in conformity with the description thereof contained in this manual and accompanying labels and/or inserts when installed, operated, maintained and repaired in accordance with the instructions provided. This equipment must be checked periodically. Malfunctioning or poorly maintained equipment should not be used. Parts that are broken, missing, worn, distorted or contaminated should be replaced immediately. Should such repair or replacement become necessary, the manufacturer recommends that a telephone or written request for service advice be made to the Authorized Distributor from whom it was purchased.

This equipment or any of its parts should not be altered without the prior written approval of the manufacturer. The user of this equipment shall have the sole responsibility for any malfunction which results from improper use, faulty maintenance, damage, improper repair or alteration by anyone other than the manufacturer or a service facility designated by the manufacturer.



**READ AND UNDERSTAND THE INSTRUCTION MANUAL BEFORE INSTALLING OR OPERATING.**

**PROTECT YOURSELF AND OTHERS!**

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## TABLE OF CONTENTS

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SECTION PARAGRAPH	TITLE	PAGE
SECTION 1	SAFETY.....	5
SECTION 2	DESCRIPTION .....	17
SECTION 3	INSTALLATION .....	23
SECTION 4	OPERATION.....	31
SECTION 5	MAINTENANCE .....	37
SECTION 6	TROUBLESHOOTING .....	39
SECTION 7	REPLACEMENT PARTS.....	45

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## TABLE OF CONTENTS

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## 1.0 Safety Precautions



**WARNING:** These Safety Precautions are for your protection. They summarize precautionary information from the references listed in Additional Safety Information section. Before performing any installation or operating procedures, be sure to read and follow the safety precautions listed below as well as all other manuals, material safety data sheets, labels, etc. Failure to observe Safety Precautions can result in injury or death.



**PROTECT YOURSELF AND OTHERS --** Some welding, cutting, and gouging processes are noisy and require ear protection. The arc, like the sun, emits ultraviolet (UV) and other radiation and can injure skin and eyes. Hot metal can cause burns. Training in the proper use of the processes and equipment is essential to prevent accidents. Therefore:

1. Always wear safety glasses with side shields in any work area, even if welding helmets, face shields, and goggles are also required.
2. Use a face shield fitted with the correct filter and cover plates to protect your eyes, face, neck, and ears from sparks and rays of the arc when operating or observing operations. Warn bystanders not to watch the arc and not to expose themselves to the rays of the electric-arc or hot metal.
3. Wear flameproof gauntlet type gloves, heavy long-sleeve shirt, cuffless trousers, high-topped shoes, and a welding helmet or cap for hair protection, to protect against arc rays and hot sparks or hot metal. A flameproof apron may also be desirable as protection against radiated heat and sparks.
4. Hot sparks or metal can lodge in rolled up sleeves, trouser cuffs, or pockets. Sleeves and collars should be kept buttoned, and open pockets eliminated from the front of clothing.
5. Protect other personnel from arc rays and hot sparks with a suitable non-flammable partition or curtains.
6. Use goggles over safety glasses when chipping slag or grinding. Chipped slag may be hot and can fly far. Bystanders should also wear goggles over safety glasses.

## 1.1 Safety - English



**FIRES AND EXPLOSIONS --** Heat from flames and arcs can start fires. Hot slag or sparks can also cause fires and explosions. Therefore:

1. Remove all combustible materials well away from the work area or cover the materials with a protective non-flammable covering. Combustible materials include wood, cloth, sawdust, liquid and gas fuels, solvents, paints and coatings, paper, etc.
2. Hot sparks or hot metal can fall through cracks or crevices in floors or wall openings and cause a hidden smoldering fire or fires on the floor below. Make certain that such openings are protected from hot sparks and metal."
3. Do not weld, cut or perform other hot work until the work piece has been completely cleaned so that there are no substances on the work piece which might produce flammable or toxic vapors. Do not do hot work on closed containers. They may explode.
4. Have fire extinguishing equipment handy for instant use, such as a garden hose, water pail, sand bucket, or portable fire extinguisher. Be sure you are trained in its use.
5. Do not use equipment beyond its ratings. For example, overloaded welding cable can overheat and create a fire hazard.
6. After completing operations, inspect the work area to make certain there are no hot sparks or hot metal which could cause a later fire. Use fire watchers when necessary.
7. For additional information, refer to NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", available from the National Fire Protection Association, Battery March Park, Quincy, MA 02269.



**ELECTRICAL SHOCK --** Contact with live electrical parts and ground can cause severe injury or death. **DO NOT** use AC welding current in damp areas, if movement is confined, or if there is danger of falling.

1. Be sure the power source frame (chassis) is connected to the ground system of the input power.
2. Connect the work piece to a good electrical ground.
3. Connect the work cable to the work piece. A poor or missing connection can expose you or others to a fatal shock.
4. Use well-maintained equipment. Replace worn or damaged cables.
5. Keep everything dry, including clothing, work area, cables, torch/electrode holder, and power source.
6. Make sure that all parts of your body are insulated from work and from ground.
7. Do not stand directly on metal or the earth while working in tight quarters or a damp area; stand on dry boards or an insulating platform and wear rubber-soled shoes.
8. Put on dry, hole-free gloves before turning on the power.
9. Turn off the power before removing your gloves.
10. Refer to ANSI/ASC Standard Z49.1 (listed on next page) for specific grounding recommendations. Do not mistake the work lead for a ground cable.

**ELECTRIC AND MAGNETIC FIELDS**

— May be dangerous. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding and cutting current creates EMF around welding cables and welding machines. Therefore:

1. Welders having pacemakers should consult their physician before welding. EMF may interfere with some pacemakers.
2. Exposure to EMF may have other health effects which are unknown.

3. Welders should use the following procedures to minimize exposure to EMF:

A. Route the electrode and work cables together. Secure them with tape when possible.

B. Never coil the torch or work cable around your body.

C. Do not place your body between the torch and work cables. Route cables on the same side of your body.

D. Connect the work cable to the work piece as close as possible to the area being welded.

E. Keep welding power source and cables as far away from your body as possible.

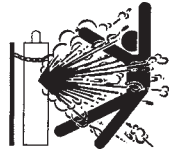


**FUMES AND GASES** -- Fumes and gases, can cause discomfort or harm, particularly in confined spaces. Do not breathe fumes and gases. Shielding gases can cause asphyxiation.

Therefore:

1. Always provide adequate ventilation in the work area by natural or mechanical means. Do not weld, cut, or gouge on materials such as galvanized steel, stainless steel, copper, zinc, lead, beryllium, or cadmium unless positive mechanical ventilation is provided. Do not breathe fumes from these materials.
2. Do not operate near degreasing and spraying operations. The heat or arc rays can react with chlorinated hydrocarbon vapors to form phosgene, a highly toxic gas, and other irritant gases.
3. If you develop momentary eye, nose, or throat irritation while operating, this is an indication that ventilation is not adequate. Stop work and take necessary steps to improve ventilation in the work area. Do not continue to operate if physical discomfort persists.
4. Refer to ANSI/ASC Standard Z49.1 (see listing below) for specific ventilation recommendations.

5. **WARNING:** This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code §25249.5 et seq.)



**CYLINDER HANDLING** -- Cylinders, if mishandled, can rupture and violently release gas. Sudden rupture of cylinder, valve, or relief device can injure or kill. Therefore:

1. Use the proper gas for the process and use the proper pressure reducing regulator designed to operate from the compressed gas cylinder. Do not use adaptors. Maintain hoses and fittings in good condition. Follow manufacturer's operating instructions for mounting regulator to a compressed gas cylinder.
  2. Always secure cylinders in an upright position by chain or strap to suitable hand trucks, undercarriages, benches, walls, post, or racks. Never secure cylinders to work tables or fixtures where they may become part of an electrical circuit.
  3. When not in use, keep cylinder valves closed. Have valve protection cap in place if regulator is not connected. Secure and move cylinders by using suitable hand trucks. Avoid rough handling of cylinders.
  4. Locate cylinders away from heat, sparks, and flames. Never strike an arc on a cylinder.
  5. For additional information, refer to CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", which is available from Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.
1. Always have qualified personnel perform the installation, troubleshooting, and maintenance work. Do not perform any electrical work unless you are qualified to perform such work.
  2. Before performing any maintenance work inside a power source, disconnect the power source from the incoming electrical power.
  3. Maintain cables, grounding wire, connections, power cord, and power supply in safe working order. Do not operate any equipment in faulty condition.
  4. Do not abuse any equipment or accessories. Keep equipment away from heat sources such as furnaces, wet conditions such as water puddles, oil or grease, corrosive atmospheres and inclement weather.
  5. Keep all safety devices and cabinet covers in position and in good repair.
  6. Use equipment only for its intended purpose. Do not modify it in any manner.



**ADDITIONAL SAFETY INFORMATION** -- For more information on safe practices for electric arc welding and cutting equipment, ask your supplier for a copy of "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

The following publications, which are available from the American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, are recommended to you:

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"



**EQUIPMENT MAINTENANCE** -- Faulty or improperly maintained equipment can cause injury or death. Therefore:

- 5. AWS C5.5 - "Recommended Practices for Gas Tungsten Arc Welding"
- 6. AWS C5.6 - "Recommended Practices for Gas Metal Arc Welding"
- 7. AWS SP - "Safe Practices" - Reprint, Welding Handbook.
- 8. ANSI/AWS F4.1, "Recommended Safe Practices for Welding and Cutting of Containers That Have Held Hazardous Substances."



**MEANING OF SYMBOLS - As used throughout this manual: Means Attention! Be Alert! Your safety is involved.**



Means immediate hazards which, if not avoided, will result in immediate, serious personal injury or loss of life.



Means potential hazards which could result in personal injury or loss of life.



Means hazards which could result in minor personal injury.



## 1.2 Safety - Spanish



**ADVERTENCIA:** Estas Precauciones de Seguridad son para su protección. Ellas hacen resumen de información proveniente de las referencias listadas en la sección "Información Adicional Sobre La Seguridad". Antes de hacer cualquier instalación o procedimiento de operación, asegúrese de leer y seguir las precauciones de seguridad listadas a continuación así como también todo manual, hoja de datos de seguridad del material, calcomanías, etc. El no observar las Precauciones de Seguridad puede resultar en daño a la persona o muerte.



**PROTEJASE USTED Y A LOS DEMAS--** Algunos procesos de soldadura, corte y ranurado son ruidosos y requieren protección para los oídos. El arco, como el sol, emite rayos ultravioleta (UV) y otras radiaciones que pueden dañar la piel y los ojos. El metal caliente causa quemaduras. EL entrenamiento en el uso propio de los equipos y sus procesos es esencial para prevenir accidentes. Por lo tanto:

1. Utilice gafas de seguridad con protección a los lados siempre que esté en el área de trabajo, aún cuando esté usando careta de soldar, protector para su cara u otro tipo de protección.
2. Use una careta que tenga el filtro correcto y lente para proteger sus ojos, cara, cuello, y oídos de las chispas y rayos del arco cuando se esté operando y observando las operaciones. Alerta a todas las personas cercanas de no mirar el arco y no exponerse a los rayos del arco eléctrico o el metal fundido.
3. Use guantes de cuero a prueba de fuego, camisa pesada de mangas largas, pantalón de ruedo liso, zapato alto al tobillo, y careta de soldar con capucha para el pelo, para proteger el cuerpo de los rayos y chispas calientes provenientes del metal fundido. En ocasiones un delantal a prueba de fuego es necesario para protegerse del calor radiado y las chispas.
4. Chispas y partículas de metal caliente puede alojarse en las mangas enrolladas de la camisa, el ruedo del pantalón o los bolsillos. Mangas y cuellos deberán mantenerse abotonados, bolsillos al frente de la camisa deberán ser cerrados o eliminados.
5. Proteja a otras personas de los rayos del arco y chispas calientes con una cortina adecuada no-flamable como división.
6. Use careta protectora además de sus gafas de seguridad cuando esté removiendo escoria o puliendo.

La escoria puede estar caliente y desprenderse con velocidad. Personas cercanas deberán usar gafas de seguridad y careta protectora.



**FUEGO Y EXPLOSIONES --** El calor de las flamas y el arco pueden ocasionar fuegos. Escoria caliente y las chispas pueden causar fuegos y explosiones. Por lo tanto:

1. Remueva todo material combustible lejos del área de trabajo o cubra los materiales con una cobija a prueba de fuego. Materiales combustibles incluyen madera, ropa, líquidos y gases inflamables, solventes, pinturas, papel, etc.
2. Chispas y partículas de metal pueden introducirse en las grietas y agujeros de pisos y paredes causando fuegos escondidos en otros niveles o espacios. Asegúrese de que toda grieta y agujero esté cubierto para proteger lugares adyacentes contra fuegos.
3. No corte, suelde o haga cualquier otro trabajo relacionado hasta que la pieza de trabajo esté totalmente limpia y libre de sustancias que puedan producir gases inflamables o vapores tóxicos. No trabaje dentro o fuera de contenedores o tanques cerrados. Estos pueden explotar si contienen vapores inflamables.
4. Tenga siempre a la mano equipo extintor de fuego para uso instantáneo, como por ejemplo una manguera con agua, cubeta con agua, cubeta con arena, o extintor portátil. Asegúrese que usted esta entrenado para su uso.
5. No use el equipo fuera de su rango de operación. Por ejemplo, el calor causado por cable sobrecarga en los cables de soldar pueden ocasionar un fuego.
6. Después de terminar la operación del equipo, inspeccione el área de trabajo para cerciorarse de que las chispas o metal caliente ocasionen un fuego más tarde. Tenga personal asignado para vigilar si es necesario.
7. Para información adicional, haga referencia a la publicación NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", disponible a través de la National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.



**CHOQUE ELECTRICO --** El contacto con las partes eléctricas energizadas y tierra puede causar daño severo o muerte. NO use soldadura de corriente alterna (AC) en áreas húmedas, de movimiento confinado en lugares estrechos o si hay posibilidad de caer al suelo.

1. Asegúrese de que el chasis de la fuente de poder esté conectado a tierra a través del sistema de electricidad primario.
2. Conecte la pieza de trabajo a un buen sistema de tierra física.
3. Conecte el cable de retorno a la pieza de trabajo. Cables y conductores expuestos o con malas conexiones pueden exponer al operador u otras personas a un choque eléctrico fatal.
4. Use el equipo solamente si está en buenas condiciones. Reemplace cables rotos, dañados o con conductores expuestos.
5. Mantenga todo seco, incluyendo su ropa, el área de trabajo, los cables, antorchas, pinza del electrodo, y la fuente de poder.
6. Asegúrese que todas las partes de su cuerpo están insuladas de ambos, la pieza de trabajo y tierra.
7. No se pare directamente sobre metal o tierra mientras trabaja en lugares estrechos o áreas húmedas; trabaje sobre un pedazo de madera seco o una plataforma insulada y use zapatos con suela de goma.
8. Use guantes secos y sin agujeros antes de energizar el equipo.
9. Apague el equipo antes de quitarse sus guantes.
10. Use como referencia la publicación ANSI/ASC Standard Z49.1 (listado en la próxima página) para recomendaciones específicas de como conectar el equipo a tierra. No confunda el cable de soldar a la pieza de trabajo con el cable a tierra.



**CAMPOS ELECTRICOS Y MAGNETICOS** - Son peligrosos. La corriente eléctrica fluye a través de cualquier conductor causando a nivel local Campos Eléctricos y Magnéticos (EMF). Las corrientes en el área de corte y soldadura, crean EMF alrededor de los cables de soldar y las máquinas. Por lo tanto:

1. Soldadores u Operadores que use marca-pasos para el corazón deberán consultar a su médico antes de soldar. El Campo Electromagnético (EMF) puede interferir con algunos marca-pasos.
2. Exponerse a campos electromagnéticos (EMF) puede causar otros efectos de salud aún desconocidos.

3. Los soldadores deberán usar los siguientes procedimientos para minimizar exponerse al EMF:

- A. Mantenga el electrodo y el cable a la pieza de trabajo juntos, hasta llegar a la pieza que usted quiere soldar. Asegúrelos uno junto al otro con cinta adhesiva cuando sea posible.
- B. Nunca envuelva los cables de soldar alrededor de su cuerpo.
- C. Nunca ubique su cuerpo entre la antorcha y el cable, a la pieza de trabajo. Mantenga los cables a un sólo lado de su cuerpo.
- D. Conecte el cable de trabajo a la pieza de trabajo lo más cercano posible al área de la soldadura.
- E. Mantenga la fuente de poder y los cables de soldar lo más lejos posible de su cuerpo.



**HUMO Y GASES** -- El humo y los gases, pueden causar malestar o daño, particularmente en espacios sin ventilación. No inhale el humo o gases. El gas de protección puede causar falta de oxígeno. Por lo tanto:

1. Siempre provea ventilación adecuada en el área de trabajo por medio natural o mecánico. No solde, corte, o ranure materiales con hierro galvanizado, acero inoxidable, cobre, zinc, plomo, berilio, o cadmio a menos que provea ventilación mecánica positiva. No respire los gases producidos por estos materiales.
2. No opere cerca de lugares donde se aplique sustancias químicas en aerosol. El calor de los rayos del arco pueden reaccionar con los vapores de hidrocarburo clorinado para formar un fosfógeno, o gas tóxico, y otros irritantes.
3. Si momentáneamente desarrolla irritación de ojos, nariz o garganta mientras está operando, es indicación de que la ventilación no es apropiada. Pare de trabajar y tome las medidas necesarias para mejorar la ventilación en el área de trabajo. No continúe operando si el malestar físico persiste.
4. Haga referencia a la publicación ANSI/ASC Standard Z49.1 (Vea la lista a continuación) para recomendaciones específicas en la ventilación.

- 5. ADVERTENCIA--** Este producto cuando se utiliza para soldaduras o cortes, produce humos o gases, los cuales contienen químicos conocidos por el Estado de California de causar defectos en el nacimiento, o en algunos casos, Cancer. (California Health & Safety Code §25249.5 et seq.)



**MANEJO DE CILINDROS--** Los cilindros, si no son manejados correctamente, pueden romperse y liberar violentamente gases. Rotura repentina del cilindro, válvula, o válvula de escape puede causar daño o muerte. Por lo tanto:

1. Utilice el gas apropiado para el proceso y utilice un regulador diseñado para operar y reducir la presión del cilindro de gas. No utilice adaptadores. Mantenga las mangueras y las conexiones en buenas condiciones. Observe las instrucciones de operación del fabricante para montar el regulador en el cilindro de gas comprimido.
2. Asegure siempre los cilindros en posición vertical y amárrelos con una correa o cadena adecuada para asegurar el cilindro al carro, transportes, tablleros, paredes, postes, o armazón. Nunca asegure los cilindros a la mesa de trabajo o las piezas que son parte del circuito de soldadura. Este puede ser parte del circuito eléctrico.
3. Cuando el cilindro no está en uso, mantenga la válvula del cilindro cerrada. Ponga el capote de protección sobre la válvula si el regulador no está conectado. Asegure y mueva los cilindros utilizando un carro o transporte adecuado. Evite el manejo brusco de los
1. Siempre tenga personal cualificado para efectuar la instalación, diagnóstico, y mantenimiento del equipo. No ejecute ningún trabajo eléctrico a menos que usted esté cualificado para hacer el trabajo.
2. Antes de dar mantenimiento en el interior de la fuente de poder, desconecte la fuente de poder del suministro de electricidad primaria.
3. Mantenga los cables, cable a tierra, conexiones, cable primario, y cualquier otra fuente de poder en buen estado operacional. No opere ningún equipo en malas condiciones.
4. No abuse del equipo y sus accesorios. Mantenga el equipo lejos de cosas que generen calor como hornos, también lugares húmedos como charcos de agua, aceite o grasa, atmósferas corrosivas y las inclemencias del tiempo.
5. Mantenga todos los artículos de seguridad y coberturas del equipo en su posición y en buenas condiciones.
6. Use el equipo sólo para el propósito que fue diseñado. No modifique el equipo en ninguna manera.

**INFORMACION ADICIONAL DE SEGURIDAD --** Para más información sobre las prácticas de seguridad de los equipos de arco eléctrico para soldar y cortar, pregunte a su proveedor por una copia de "Precautions and Safe Practices for Arc Welding, Cutting and Gouging-Form 52-529."



Las siguientes publicaciones, disponibles a través de la American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126, son recomendadas para usted:

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"



**MANTENIMIENTO DEL EQUIPO --** Equipo defectuoso o mal mantenido puede causar daño o muerte. Por lo tanto:

**SIGNIFICADO DE LOS SIMBOLOS**

--Según usted avanza en la lectura de este folleto: Los Símbolos Significan ¡Atención! ¡Esté Alerta! Se trata de su seguridad.



Significa riesgo inmediato que, de no ser evadido, puede resultar inmediatamente en serio daño personal o la muerte.



Significa el riesgo de un peligro potencial que puede resultar en serio daño personal o la muerte.



Significa el posible riesgo que puede resultar en menores daños a la persona.

## 1.3 Safety - French



**AVERTISSEMENT :** Ces règles de sécurité ont pour but d'assurer votre protection. Ils récapitulent les informations de précaution provenant des références dans la section des Informations de sécurité supplémentaires. Avant de procéder à l'installation ou d'utiliser l'unité, assurez-vous de lire et de suivre les précautions de sécurité ci-dessous, dans les manuels, les fiches d'information sur la sécurité du matériel et sur les étiquettes, etc. Tout défaut d'observer ces précautions de sécurité peut entraîner des blessures graves ou mortelles.



**PROTÉGEZ-VOUS** -- Les processus de soudage, de coupage et de gougeage produisent un niveau de bruit élevé et exigent l'emploi d'une protection auditive. L'arc, tout comme le soleil, émet des rayons ultraviolets en plus d'autre rayons qui peuvent causer des blessures à la peau et les yeux. Le métal incandescent peut causer des brûlures. Une formation reliée à l'usage des processus et de l'équipement est essentielle pour prévenir les accidents. Par conséquent :

1. Portez des lunettes protectrices munies d'écrans latéraux lorsque vous êtes dans l'aire de travail, même si vous devez porter un casque de soudeur, un écran facial ou des lunettes étanches.
2. Portez un écran facial muni de verres filtrants et de plaques protectrices appropriées afin de protéger vos yeux, votre visage, votre cou et vos oreilles des étincelles et des rayons de l'arc lors d'une opération ou lorsque vous observez une opération. Avertissez les personnes se trouvant à proximité de ne pas regarder l'arc et de ne pas s'exposer aux rayons de l'arc électrique ou le métal incandescent.
3. Portez des gants ignifugés à crêpe, une chemise épaisse à manches longues, des pantalons sans rebord et des chaussures montantes afin de vous protéger des rayons de l'arc, des étincelles et du métal incandescent, en plus d'un casque de soudeur ou casquette pour protéger vos cheveux. Il est également recommandé de porter un tablier ininflammable afin de vous protéger des étincelles et de la chaleur par rayonnement.
4. Les étincelles et les projections de métal incandescent risquent de se loger dans les manches retroussées, les rebords de pantalons ou les poches. Il est recommandé de garder boutonnés le col et les manches et de porter des vêtements sans poches en avant.
5. Protégez toute personne se trouvant à proximité des étincelles et des rayons de l'arc à l'aide d'un rideau ou d'une cloison ininflammable.
6. Portez des lunettes étanches par dessus vos lunettes de sécurité lors des opérations d'écaillage ou de meulage du laitier. Les écailles de laitier incandescent peuvent être projetées à des distances considérables. Les personnes se trouvant à proximité doivent également porter des lunettes étanches par dessus leur lunettes de sécurité.



**INCENDIES ET EXPLOSIONS** -- La chaleur provenant des flammes ou de l'arc peut provoquer un incendie. Le laitier incandescent ou les étincelles peuvent également provoquer un incendie ou une explosion. Par conséquent :

1. Éloignez suffisamment tous les matériaux combustibles de l'aire de travail et recouvrez les matériaux avec un revêtement protecteur ininflammable. Les matériaux combustibles incluent le bois, les vêtements, la sciure, le gaz et les liquides combustibles, les solvants, les peintures et les revêtements, le papier, etc.
2. Les étincelles et les projections de métal incandescent peuvent tomber dans les fissures dans les planchers ou dans les ouvertures des murs et déclencher un incendie couvant à l'étage inférieur. Assurez-vous que ces ouvertures sont bien protégées des étincelles et du métal incandescent.
3. N'exécutez pas de soudure, de coupe ou autre travail à chaud avant d'avoir complètement nettoyé la surface de la pièce à traiter de façon à ce qu'il n'ait aucune substance présente qui pourrait produire des vapeurs inflammables ou toxiques. N'exécutez pas de travail à chaud sur des contenants fermés car ces derniers pourraient exploser.
4. Assurez-vous qu'un équipement d'extinction d'incendie est disponible et prêt à servir, tel qu'un tuyau d'arrosage, un seau d'eau, un seau de sable ou un extincteur portatif. Assurez-vous d'être bien instruit par rapport à l'usage de cet équipement.
5. Assurez-vous de ne pas excéder la capacité de l'équipement. Par exemple, un câble de soudage surchargé peut surchauffer et provoquer un incendie.
6. Une fois les opérations terminées, inspectez l'aire de travail pour assurer qu'aucune étincelle ou projection de métal incandescent ne risque de provoquer un incendie ultérieurement. Employez des guetteurs d'incendie au besoin.
7. Pour obtenir des informations supplémentaires, consultez le NFPA Standard 51B, "Fire Prevention in Use of Cutting and Welding Processes", disponible au National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.



**CHOC ÉLECTRIQUE** -- Le contact avec des pièces électriques ou les pièces de mise à la terre sous tension peut causer des blessures graves ou mortelles. NE PAS utiliser un courant de soudage c.a. dans un endroit humide, en espace restreint ou si un danger de chute se pose.



1. Assurez-vous que le châssis de la source d'alimentation est branché au système de mise à la terre de l'alimentation d'entrée.
2. Branchez la pièce à traiter à une bonne mise de terre électrique.
3. Branchez le câble de masse à la pièce à traiter et assurez une bonne connexion afin d'éviter le risque de choc électrique mortel.
4. Utilisez toujours un équipement correctement entretenu. Remplacez les câbles usés ou endommagés.
5. Veillez à garder votre environnement sec, incluant les vêtements, l'aire de travail, les câbles, le porte-électrode/torche et la source d'alimentation.
6. Assurez-vous que tout votre corps est bien isolé de la pièce à traiter et des pièces de la mise à la terre.
7. Si vous devez effectuer votre travail dans un espace restreint ou humide, ne tenez vous pas directement sur le métal ou sur la terre; tenez-vous sur des planches sèches ou une plate-forme isolée et portez des chaussures à semelles de caoutchouc.
8. Avant de mettre l'équipement sous tension, isolez vos mains avec des gants secs et sans trous.
9. Mettez l'équipement hors tension avant d'enlever vos gants.
10. Consultez ANSI/ASC Standard Z49.1 (listé à la page suivante) pour des recommandations spécifiques concernant les procédures de mise à la terre. Ne pas confondre le câble de masse avec le câble de mise à la terre.



**CHAMPS ÉLECTRIQUES ET MAGNÉTIQUES** — comportent un risque de danger. Le courant électrique qui passe dans n'importe quel conducteur produit des champs électriques et magnétiques localisés. Le soudage et le courant de coupage créent des champs électriques et magnétiques autour des câbles de soudage et l'équipement. Par conséquent :

1. Un soudeur ayant un stimulateur cardiaque doit consulter son médecin avant d'entreprendre une opération de soudage. Les champs électriques et magnétiques peuvent causer des ennuis pour certains stimulateurs cardiaques.
2. L'exposition à des champs électriques et magnétiques peut avoir des effets néfastes inconnus pour la santé.

3. Les soudeurs doivent suivre les procédures suivantes pour minimiser l'exposition aux champs électriques et magnétiques :

- A. Acheminez l'électrode et les câbles de masse ensemble. Fixez-les à l'aide d'une bande adhésive lorsque possible.
- B. Ne jamais enrouler la torche ou le câble de masse autour de votre corps.
- C. Ne jamais vous placer entre la torche et les câbles de masse. Acheminez tous les câbles sur le même côté de votre corps.
- D. Branchez le câble de masse à la pièce à traiter le plus près possible de la section à souder.
- E. Veillez à garder la source d'alimentation pour le soudage et les câbles à une distance appropriée de votre corps.

**LES VAPEURS ET LES GAZ** -- peuvent causer un malaise ou des dommages corporels, plus particulièrement dans les espaces restreints. Ne respirez pas les vapeurs et les gaz. Le gaz de protection risque de causer l'asphyxie. Par conséquent :



1. Assurez en permanence une ventilation adéquate dans l'aire de travail en maintenant une ventilation naturelle ou à l'aide de moyens mécanique. N'effectuez jamais de travaux de soudage, de coupage ou de gougeage sur des matériaux tels que l'acier galvanisé, l'acier inoxydable, le cuivre, le zinc, le plomb, le beryllium ou le cadmium en l'absence de moyens mécaniques de ventilation efficaces. Ne respirez pas les vapeurs de ces matériaux.
2. N'effectuez jamais de travaux à proximité d'une opération de dégraissage ou de pulvérisation. Lorsque la chaleur ou le rayonnement de l'arc entre en contact avec les vapeurs d'hydrocarbure chloré, ceci peut déclencher la formation de phosgène ou d'autres gaz irritants, tous extrêmement toxiques.
3. Une irritation momentanée des yeux, du nez ou de la gorge au cours d'une opération indique que la ventilation n'est pas adéquate. Cessez votre travail afin de prendre les mesures nécessaires pour améliorer la ventilation dans l'aire de travail. Ne poursuivez pas l'opération si le malaise persiste.
4. Consultez ANSI/ASC Standard Z49.1 (à la page suivante) pour des recommandations spécifiques concernant la ventilation.

**5. AVERTISSEMENT :** Ce produit, lorsqu'il est utilisé dans une opération de soudage ou de coupage, dégage des vapeurs ou des gaz contenant des chimiques considérées par l'état de la Californie comme étant une cause des malformations congénitales et dans certains cas, du cancer. (California Health & Safety Code §25249.5 et seq.)



**MANIPULATION DES CYLINDRES --** La manipulation d'un cylindre, sans observer les précautions nécessaires, peut produire des fissures et un échappement dangereux des gaz.

Une brisure soudaine du cylindre, de la soupape ou du dispositif de surpression peut causer des blessures graves ou mortelles. Par conséquent :

1. Utilisez toujours le gaz prévu pour une opération et le détendeur approprié conçu pour utilisation sur les cylindres de gaz comprimé. N'utilisez jamais d'adaptateur. Maintenez en bon état les tuyaux et les raccords. Observez les instructions d'opération du fabricant pour assembler le détendeur sur un cylindre de gaz comprimé.
2. Fixez les cylindres dans une position verticale, à l'aide d'une chaîne ou une sangle, sur un chariot manuel, un châssis de roulement, un banc, un mur, une colonne ou un support convenable. Ne fixez jamais un cylindre à un poste de travail ou toute autre dispositif faisant partie d'un circuit électrique.
3. Lorsque les cylindres ne servent pas, gardez les soupapes fermées. Si le détendeur n'est pas branché, assurez-vous que le bouchon de protection de la soupape est bien en place. Fixez et déplacez les cylindres à l'aide d'un chariot manuel approprié. Toujours manipuler les cylindres avec soin.
4. Placez les cylindres à une distance appropriée de toute source de chaleur, des étincelles et des flammes. Ne jamais amorcer l'arc sur un cylindre.
5. Pour de l'information supplémentaire, consultez CGA Standard P-1, "Precautions for Safe Handling of Compressed Gases in Cylinders", mis à votre disposition par le Compressed Gas Association, 1235 Jefferson Davis Highway, Arlington, VA 22202.



**ENTRETIEN DE L'ÉQUIPEMENT --** Un équipement entretenu de façon défectueuse ou inadéquate peut causer des blessures graves ou mortelles. Par conséquent :

1. Efforcez-vous de toujours confier les tâches d'installation, de dépannage et d'entretien à un personnel qualifié. N'effectuez aucune réparation électrique à moins d'être qualifié à cet effet.
2. Avant de procéder à une tâche d'entretien à l'intérieur de la source d'alimentation, débranchez l'alimentation électrique.
3. Maintenez les câbles, les fils de mise à la terre, les branchements, le cordon d'alimentation et la source d'alimentation en bon état. N'utilisez jamais un équipement s'il présente une défectuosité quelconque.
4. N'utilisez pas l'équipement de façon abusive. Gardez l'équipement à l'écart de toute source de chaleur, notamment des fours, de l'humidité, des flaques d'eau, de l'huile ou de la graisse, des atmosphères corrosives et des intempéries.
5. Laissez en place tous les dispositifs de sécurité et tous les panneaux de la console et maintenez-les en bon état.
6. Utilisez l'équipement conformément à son usage prévu et n'effectuez aucune modification.



**INFORMATIONS SUPPLÉMENTAIRES RELATIVES À LA SÉCURITÉ --** Pour obtenir de l'information supplémentaire sur les règles de sécurité à observer pour l'équipement de soudage à l'arc électrique et le coupage, demandez un exemplaire du livret "Precautions and Safe Practices for Arc Welding, Cutting and Gouging", Form 52-529.

Les publications suivantes sont également recommandées et mises à votre disposition par l'American Welding Society, 550 N.W. LeJuene Road, Miami, FL 33126 :

1. ANSI/ASC Z49.1 - "Safety in Welding and Cutting"
2. AWS C5.1 - "Recommended Practices for Plasma Arc Welding"
3. AWS C5.2 - "Recommended Practices for Plasma Arc Cutting"
4. AWS C5.3 - "Recommended Practices for Air Carbon Arc Gouging and Cutting"

**SIGNIFICATION DES SYMBOLES**

Ce symbole, utilisé partout dans ce manuel, signifie "Attention" ! Soyez vigilant ! Votre sécurité est en jeu.

**DANGER**

Signifie un danger immédiat. La situation peut entraîner des blessures graves ou mortelles.

**AVERTISSEMENT**

Signifie un danger potentiel qui peut entraîner des blessures graves ou mortelles.

**ATTENTION**

Signifie un danger qui peut entraîner des blessures corporelles mineures.



The ESP-100i is a multipurpose 100 amp plasma cutting system for both manual and mechanized cutting. ESAB's proprietary ESP (ESAB Smart Plasmarc) technology yields a machine that is the perfect solution for production cutting, plasma gouging, and mechanized applications such as cutting machines, robotics, retrofits, etc.

- With PT-25 manual torch, production cuts 1-1/4 inch carbon steel and severs 1-1/2 inches (see PT-20AM data sheet for mechanized cutting parameters)
- Low-current-draws technology minimizes power consumption for low cost of operation
- Compact size and standard casters facilitate movement around the shop so you can take the console to the job
- Continuously variable output from 10 to 100 amps gives the ability to tailor the cutting current to the job
- ESAB Smart Plasmarc automation interface is standard in all machines enabling it to be used for both manual and mechanized cutting
- Universal voltage input. The standard machine accepts all voltages from 200 to 575 volts at both 50 and 60 Hz line frequencies
- Available in pre-engineered packages with all necessary components included
- Digital ammeter for accurate current setting
- Dual gas plumbing to use with Dual Gas PT-25 manual torch
- Plumbing box packages available where remote HF is desired for automation or retrofit applications
- Three-year warranty on console
- One-year warranty on torch

## Specifications

Output 100 amps @ 100% duty cycle

Cut capacity: See PT-25 or PT-20AM data sheets

Input Voltage ..... 200/230/380/415/460/575v 50/60hz 3ph

Input Current ..... 65/60/45/40/30/25 amps 3ph

Power Factor ..... 96%

Output Current ..... 10 to 100 amps DC

Rated Output Voltage ..... 200vdc @ 100 amps

Duty Cycle ..... 100%

Max OCV ..... 325 vdc

Dimensions

..... 22 in. (550mm) w x 28 in. (700mm) h x 32 in. (800mm) d

Weight ..... 380 lbs. (173kg)

## Torch

Uses PT-25 or PT-20AM



## How To Order

The ESP-100i comes with console, torch, torch parts kit, required cylinder regulators and hoses for gas operation, filter/regulator for air, work cable, and wheels. Mechanized packages also include an interface connector. Plumbing box packages also include plumbing box, interconnect cables, plus a shielded PT-20AM. See optional accessories.

## Ordering Information

ESP-100i Console Only ..... 33530

### ESP-100i/PT-25 Manual Packages

(See optional regulators for other gases)

ESP-100i, 25 ft. PT-25 90° Air/Air ..... 604625

ESP-100i, 50 ft. PT-25 90° Air/Air ..... 604626

ESP-100i, 25 ft. PT-25 90° N<sub>2</sub>/N<sub>2</sub> ..... 604627

ESP-100i, 25 ft. PT-25 90° Ar-H<sub>2</sub>/N<sub>2</sub> ..... 604628

ESP-100i, 50 ft. PT-25 90° N<sub>2</sub>/N<sub>2</sub> ..... 604629

ESP-100i, 50 ft. PT-25 90° Ar-H<sub>2</sub>/N<sub>2</sub> ..... 603630

Ordering Information (continued)

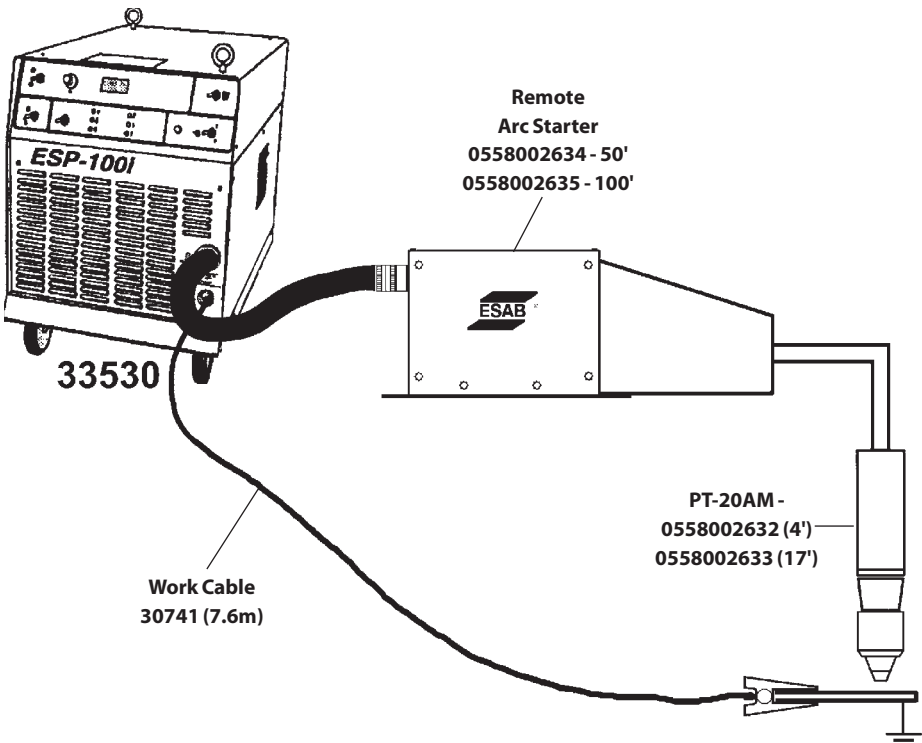
ESP-100i/PT-20AM Mechanized Packages

ESP-100i, 50 ft. shielded PT-20AM	
With Rack and Torch Holder .....	35836
ESP-100i w/arc starter, 50 ft. interconnect cables and	
4 ft. shielded PT-20AM .....	35837
ESP-100i w/arc starter, 100 ft. interconnect cables and	
4 ft. shielded PT-20AM .....	35838
ESP-100i w/arc starter, 50 ft. interconnect cables and	
17 ft. shielded PT-20AM .....	35839
ESP-100i w/arc starter, 100 ft. interconnect cables and	
17 ft. shielded PT-20AM .....	35840

Optional Accessories

Plasma Flow Measuring Kit	
This valuable troubleshooting tool allows measurement of the	
actual plasma gas flow through the torch .....	19765
Torch Guide Kit - PT-25	
This complete kit, in a rugged plastic carrying case, includes	
attachments for circle and straight line cutting on ferrous and	
non-ferrous metals, 1 3/4" - 42" Radius .....	604624

PT-25 90° Plasmit Torch Head Protector	
For gouging .....	20801
Leather Sheath	
For service line protection, 10-ft. length.....	20812
Dual Cylinder Rack for ESP-100i	
Attaches to rear of ESP-100i and allows the carrying of	
two full size cylinders.....	35833
Remote Hand Switch (Optional)	
Permits remote starting and stopping of the cutting process	
during dual gas operation.....	2075600
for mechanized single gas.....	680982
Optional Regulators and Hoses	
Regulator for CO <sub>2</sub> Secondary Gas.....	19629
Regulator for O <sub>2</sub> Secondary Gas.....	998336
Hose for CO <sub>2</sub> Secondary Gas.....	40V77
Hose for O <sub>2</sub> Secondary Gas .....	678125



System With Arc Starter

## INSPECTION

- A. Remove the shipping container and all packing material and inspect for evidence of concealed damage which may not have been apparent upon receipt of the ESP-100i. The ESP-100i is crate shipped and fully assembled with the exception of the fixed caster wheels. Immediately notify the carrier of any defects or damage.
- B. Check container for any loose parts prior to disposing of shipping materials.
- C. Check air louvers and any other opening to ensure that any obstruction is removed.

## HOISTING

The ESP-100i is equipped with two lifting eyes that enable the unit to be hoisted.



When lifting the ESP-100i be sure to use the proper chain length and both lifting eyes. Failure to take precautions when lifting will result in damage to the internal components in the power source. The chain length must be at least 60" to ensure that the 30" minimum is maintained from the chain hoist to each lifting eye. See figure 2-1.

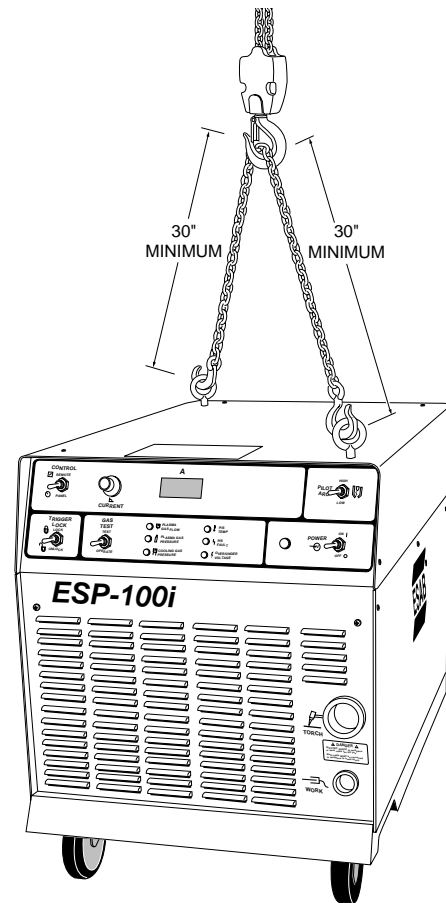


Figure 2-1. ESP-100i Hoisting Set-Up

## 2.1 GENERAL

The ESP-100i is a self-contained plasma cutting system. As shipped, the system is fully assembled and ready to cut after being connected to input power and a source of compressed air (90-150 psi). The ESP-100i package uses the heavy duty PT-25 dual gas manual torch or PT-20AM mechanized torch to deliver cutting power for materials up to 1-1/4" inch thick. Refer to the following paragraphs for descriptions of the ESP-100i packages available and performance specifications.

## 2.2 SCOPE

The purpose of this manual is to provide the operator with all the information required to install and operate the ESP-100i plasma arc cutting package. Technical reference material is also provided to assist in troubleshooting the cutting package.

## 2.3 PACKAGES AVAILABLE

Table 1-1 lists ESP-100i packages available through your ESAB dealer. Package contents are indented under each complete system description.



### WARNING

Use only torches designed for use with this unit. Use of torches not designed for use with this console could create an electrical shock hazard.

Table 2-1. Available ESP-100i Cutting Packages

	ESP-100i Package with:		
	PT-25, 90° Hd. Dual Gas Manual Air/Air		PT-20AM Mechanized Torch Air/Air
	25' Lines	50' Lines	50' Lines
ESP-100i Package, P/N	604625	604626	35836
includes:			
Power Source, ESP-100i	33530	33530	33530
PT-25 or -20AM Torch	21648	21649	21371
Torch Spare Parts Kit (See contents below)	21946	21946	21376
Air-Filter Regulator w/Mtg. Brkt.	30338	30338	30338
Work Cable, 25 ft	30741	30741	30741
Hose Assy, I.G., 6 ft (2)	31503	31503	
Gas Hose Coupler "Y"	050356	050356	
Air Hose Assy, 2.5 ft			678152

### PT-25/100 A Spare Parts Kits, P/N 21946

Quantity	Description	P/N
5	Electrode Air/N2	21595
2	Swirl Baffles	21667
5	Nozzle-100A	21597
2	Nozzle-Gouging	21599
2	Heat Shield	21654
1	Gouging Guard	21656
1	Stand-Off Guide	21943

### PT-25/150 A Spare Parts Kits, P/N 21947

Quantity	Description	P/N
5	Electrode Air/N2	21780
2	Swirl Baffles	21667
5	Nozzle-150A	21598
2	Nozzle-Gouging	21599
2	Heat Shield	21654
1	Gouging Guard	21656
1	Stand-Off Guide	21943

### PT-20 AM Spare Parts Kits

Description	P/N		Quantity		
	Standard P/N	"CE" P/N	50 A 21370	70 A 21369	100 A 21376
Heat Shield (70/100 A)	21326	4485831	-	2	2
Heat Shield (50 A)	21447	4485832	2	1	1
Cutting Nozzle (50 A)	21330	4485833	5	5	5
Cutting Nozzle (70 A)	21329	4485834	-	5	5
Cutting Nozzle (100 A)	21328	4485835	-	-	5
Electrode	21150	0558004249	5	5	5
Electrode Seat	21372	4485839	1	1	1
Electrode Insulator	21373	21373	1	1	1
Electrode Holder Assy	21332	4485840	1	1	1
Baffle Tube	21374	4485838	1	1	1
Pilot Arc Adaptor	19497	4485843	1	1	1
O-Ring	488157	4485841	5	5	5
Lubricant (1 oz.)	17672	0558000443	1	1	1
Seat/Baffle Wrench	21375	4485842	1	1	1
1/16: Hex-Key Wrench (1,6 mm)	93750006	4485651	1	1	1
Box tool	950272	950272	1	1	1

## 2.4 SPECIFICATIONS

Refer to tables 2-2 thru 2-6, and figures 2-1 and 2-2 for ESP-100i and torch technical specifications.

Table 2-2. ESP-100i Power Source Specifications

Rated Output		100% Duty Cycle	100 A @ 120 V dc
Output Current Range			10 to 100 Amperes
Open Circuit Voltage			325 V dc
Rated Primary Input, 3 phase, 50/60 Hz@ 12 kW Max. Output Power (100 A @120 V dc)	200 V		49 A / Phase
	208 V		47 A / Phase
	230 V		40 A / Phase
	380 V		25 A / Phase
	415 V		23 A / Phase
	460 V		20 A / Phase
	575 V		16 A / Phase
Power Factor @ 12kW Output			0.96
Efficiency @ 12kW Output			93% typical
Dimensions	Length		33.0" (838 mm)
	Height		27.3" (693 mm)
	Width		21.5" (546 mm)
Weight			408 lbs. (185 kg)
Shipping Weight			420 lbs. (191 kg)

Table 2-3. PT-25 Manual Torch and PT-20AM Mechanized Torch Specifications

	PT-20AM	PT-25
Plasma/Cooling Gas	Air @ 85 psi (380 cfh)	Air @ 70 psi (560 cfh) *
Shipping Weight	20 lbs	14 lbs (25 ft) 25 lbs (50 ft)
Length of Service Lines	50-ft	25 or 50 ft
Instruction Booklet	Form 15-114	Form 15-266

\* PT-25 can also be used with the following plasma/cooling gas combinations: N<sub>2</sub>/Air, H-35/N<sub>2</sub>, and 40H<sub>2</sub> - 60N<sub>2</sub>/Air. See Instruction Manual F-15-266 for details.

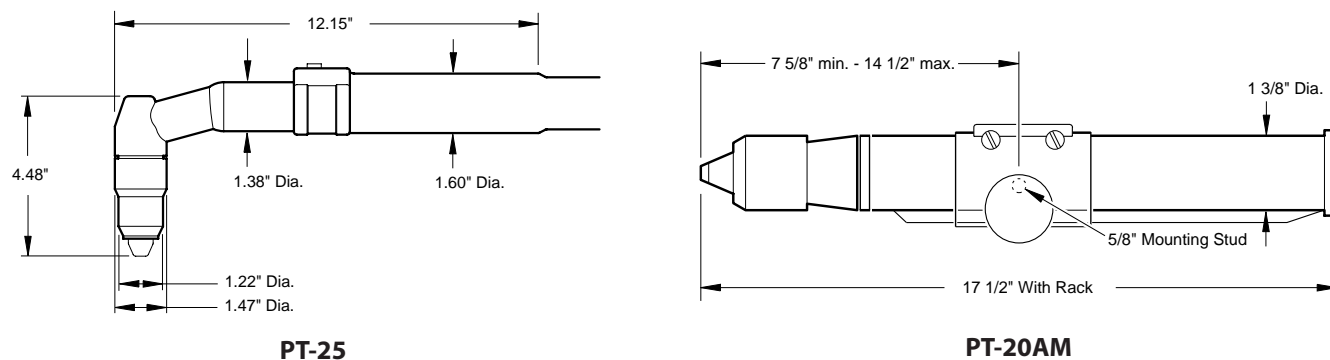


Figure 2-1. Cutting Torch Specifications

## Cutting Parameters for the PT-20AM Torch on Carbon Steel

Table 2-4. 100 Amp Data, Nozzle P/N 21328, Heat Shield P/N 21326

Metal Thickness (in.)	Air Pressure (psig)	Stand-off (in.)	Arc Volts	Travel Speed (ipm)	Kerf Width	Pierce Time (sec.)
1/4	85	1/4	110	100	1/8	0.1
1/2	85	1/4	120	45	1/8	0.3
3/4	85	1/4	125	27	1/8	1
1	85	1/4	130	15	1/8	2.75
1-1/4	85	5/16	140	10	5/32	*N.R.
1-1/2	85	5/16	145	7	3/16	*N.R.

Table 2-5. 70 Amp Data, Nozzle P/N 21329, Heat Shield P/N 21326

Metal Thickness (in.)	Air Pressure (psig)	Stand-off (in.)	Arc Volts	Travel Speed (ipm)	Kerf Width	Pierce Time (sec.)
1/8	75	3/16	95	190	3/32	0.1
1/4	75	3/16	100	80	3/32	0.2
1/2	85	1/4	115	30	3/32	0.6
3/4	85	1/4	130	15	1/8	2.25
1	85	5/16	140	7	5/32	*N.R.
1-1/4	85	5/16	155	5	5/32	*N.R.

Table 2-6. 40 &amp; 50 Amp Data, Nozzle P/N 21330, Heat Shield P/N 21447

Metal Thickness (in.)	Arc Current (Amps)	Air Pressure (psig)	Stand-off (in.)	Arc Volts	Travel Speed (ipm)	Kerf Width	Pierce Time (sec.)
1/16	40	75	1/8	110	150	3/64	0.25
1/8	40	75	1/8	110	100	3/64	0.25
3/16	50	85	1/8	110	100	1/16	0.25
1/4	50	85	3/16	120	65	5/64	0.25
3/8	50	85	1/4	130	40	5/64	0.25
1/2	50	85	5/16	150	18	3/32	1.0

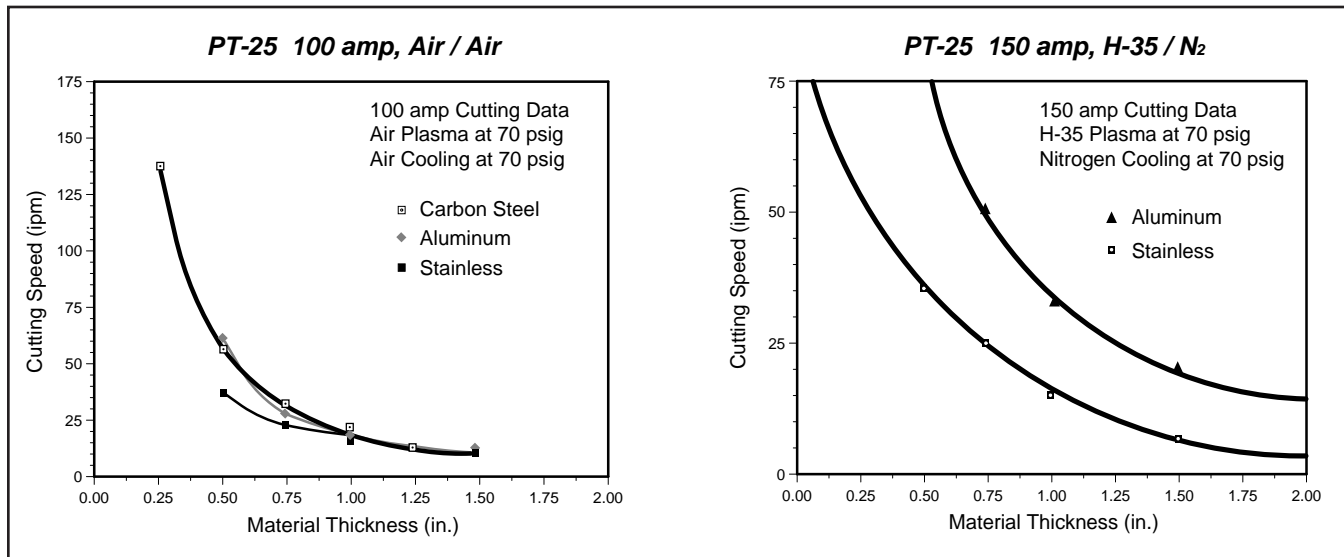


Figure 2-2. PT-25 Cutting Data

### 3.1 GENERAL

Proper installation can contribute materially to the satisfactory and trouble-free operation of the ESP-100i cutting package. It is suggested that each step in this section be studied carefully and followed as closely as possible.

### 3.2 EQUIPMENT REQUIRED

A source of clean, dry air that supplies 560 cfm at 85 psig is required for the cutting operation. The air supply should not exceed 150 psig (the maximum inlet pressure rating of the air filter-regulator supplied with the package).

### 3.3 LOCATION

Adequate ventilation is necessary to provide proper cooling of the ESP-100i. Minimize the amount of dirt, dust, and excessive heat to which the equipment is exposed. There should be at least 2 feet of clearance between the ESP-100i power source and wall or any other obstruction to allow freedom of air movement through the power source.

Installing or placing any type of filtering device will restrict the volume of intake air, thereby subjecting the power source internal components to overheating. Use of any type of filter device voids the warranty.

### 3.4 PRIMARY ELECTRICAL INPUT CONNECTIONS. (Figure 3-1.)



## WARNING

**ELECTRIC SHOCK CAN KILL!** Precautionary measures should be taken to provide maximum protection against electrical shock. Be sure that all power is off by opening the line (wall) disconnect switch and by unplugging the power cord to the unit when connections are made inside of the power source.

## CAUTION

Be sure that the power source is properly configured for your input power supply. **DO NOT** connect a power source configured for 230 V to a 460 V input power supply. Damage to the machine may occur.

As shipped, the ESP-100i is configured for 575 V, 60 Hz input. If using 200, 230, 380, 415, or 460 V input, the jumper input power cables located on the auto transformer must be repositioned to the desired input voltage for safe operation. To gain access to the autotransformer, remove the right side panel. (See figure 3-1.)

A line (wall) disconnect switch with fuses or circuit breakers should be provided at the main power panel (see figure 3-2 and table 3-1 for fuse rating). The input power cable of the console may be connected directly to the disconnect switch or a proper plug and receptacle may be purchased from a local electrical supplier. If using plug/receptacle combination, see table 3-1 for recommended input conductors for connecting receptacle to line disconnect switch.

**Table 3-1. Recommended Sizes For Input Conductors and Line Fuses**

Input Requirements			Input & Gnd Conductor CU/AWG	Fuse Ratings /Phase, Amps
Volts	Phase	Amps		
200/208	3	49	No. 8	70
230	3	40	No. 8	60
380	3	25	No. 12	40
415	3	23	No. 12	40
460	3	20	No. 14	30
575	3	16	No. 14	25

\*Sizes per National Electric Code for 75 °C rated conductors @ 30 °C ambient. Not more than three conductors in raceway or cable. Follow local codes if they specify sizes other than those listed above.

The following procedure explains the proper installation steps for connecting primary electrical power to the ESP-100i. (See figure 3-1.)

- A. Remove right side panel.
- B. Ensure input power cable is deenergized from all electrical sources.
- C. Route input power cable through the strain relief located at the rear panel.
- D. Pull input power cable through the strain relief to allow cable wires sufficient length to connect to the main contactor. Tighten strain relief to ensure input power cable is secured.
- E. Connect input power cable ground wire to the ground lug provided on the base of the ESP-100i.



## ! WARNING

Electric shock can kill! Failure to connect a good electrical ground to the base of the ESP-100i could result in electric shock.

- F. Connect three power leads of the input power cable to the terminals located atop the main contactor. Secure the leads by tightening each screw.
- G. Connect jumper power cables from the bottom of the main contactor to the proper input voltage marked on the auto transformer. The unit is factory set for 575 V.

## ! CAUTION

Ensure three input power jumper cables are connected properly to the auto transformer for your input power.

- H. Connect jumper wire to the proper input voltage connector located on the 7-position terminal block. (See figure 3-1.)

### 3.5 SECONDARY (OUTPUT) CONNECTIONS FOR MANUAL AND MECHANIZED CUTTING

## ! WARNING

Before making any connections to the power source output terminals, make sure that all primary input power to the machine is deenergized (off) at the main disconnect switch.

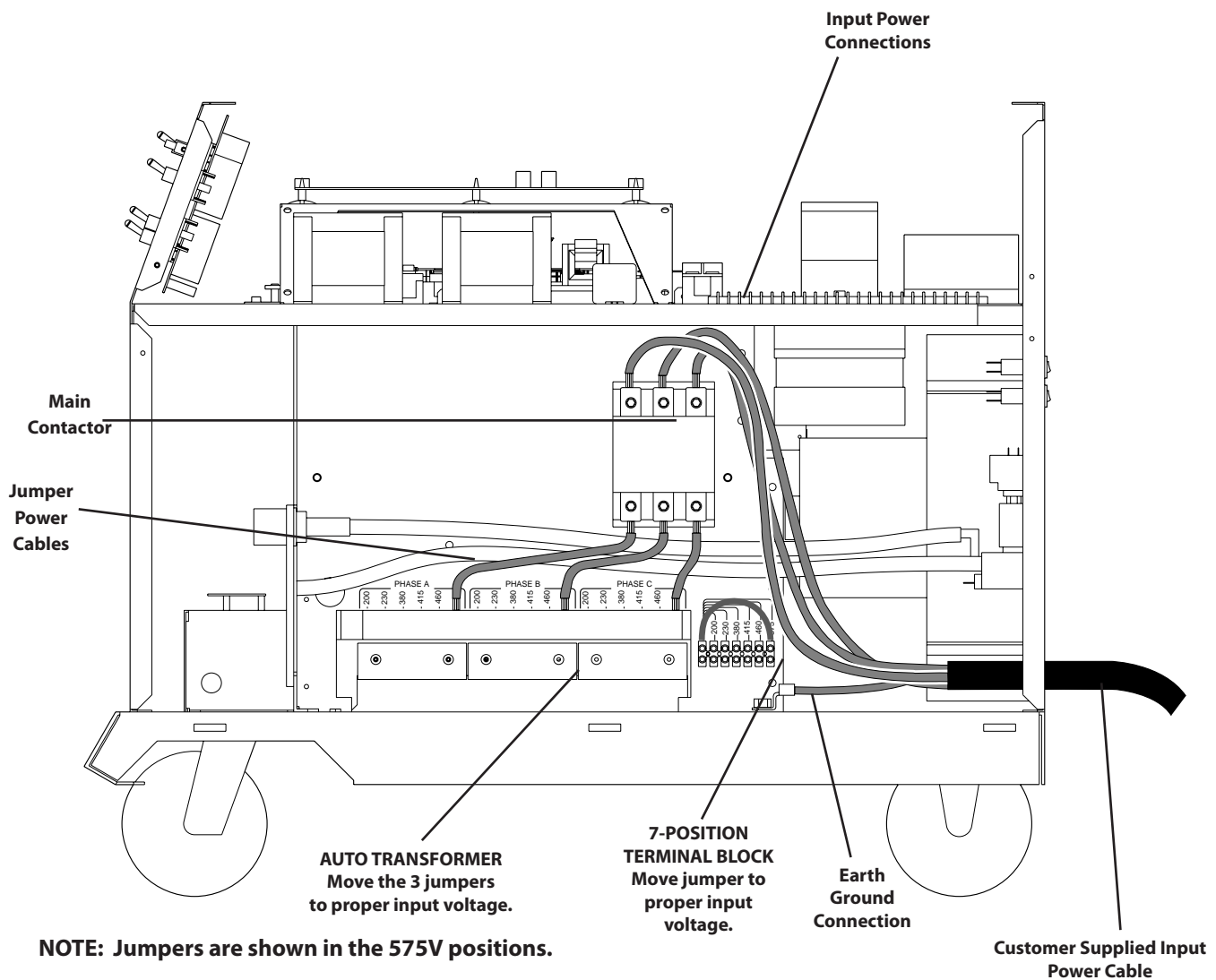
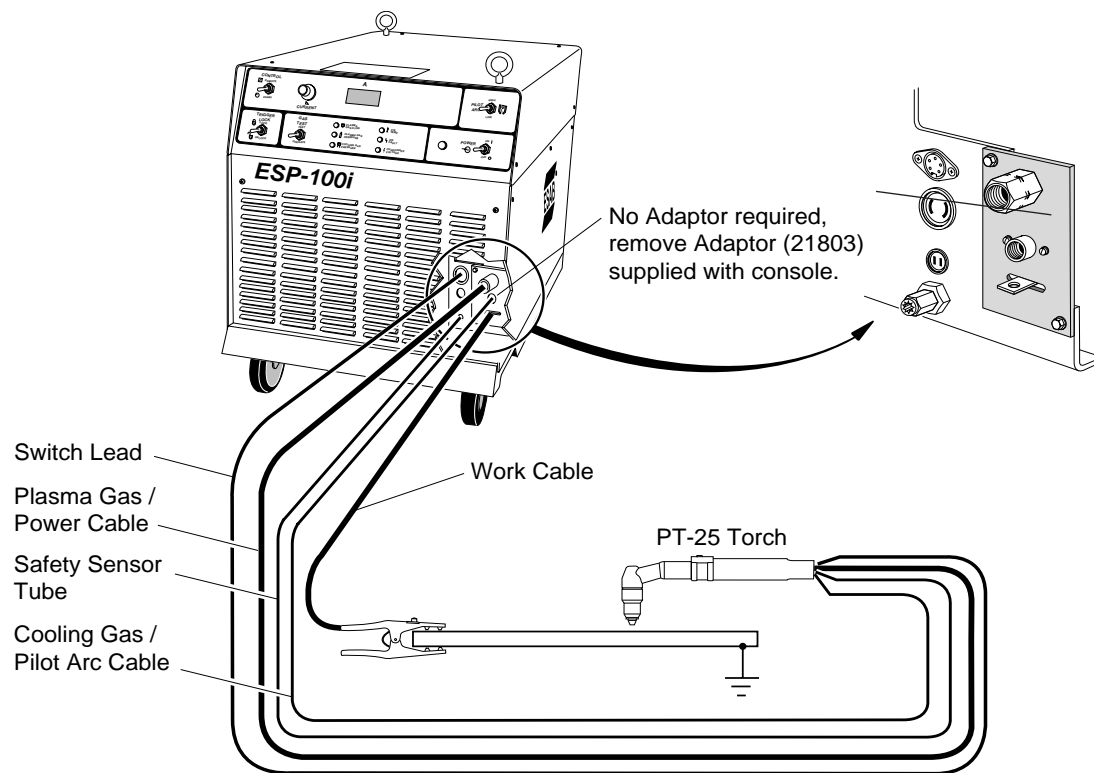
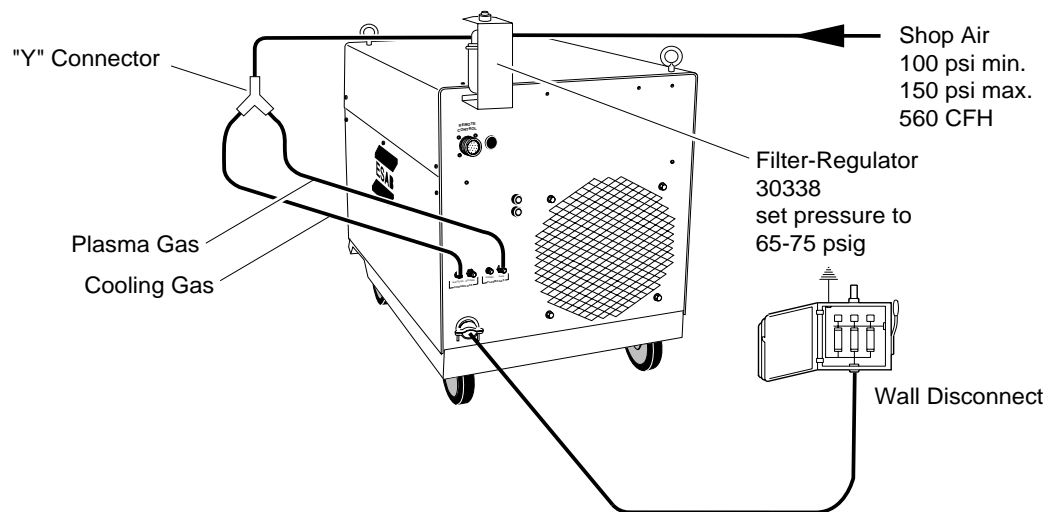


Figure 3-1. ESP-100i Primary Power Connection Diagram

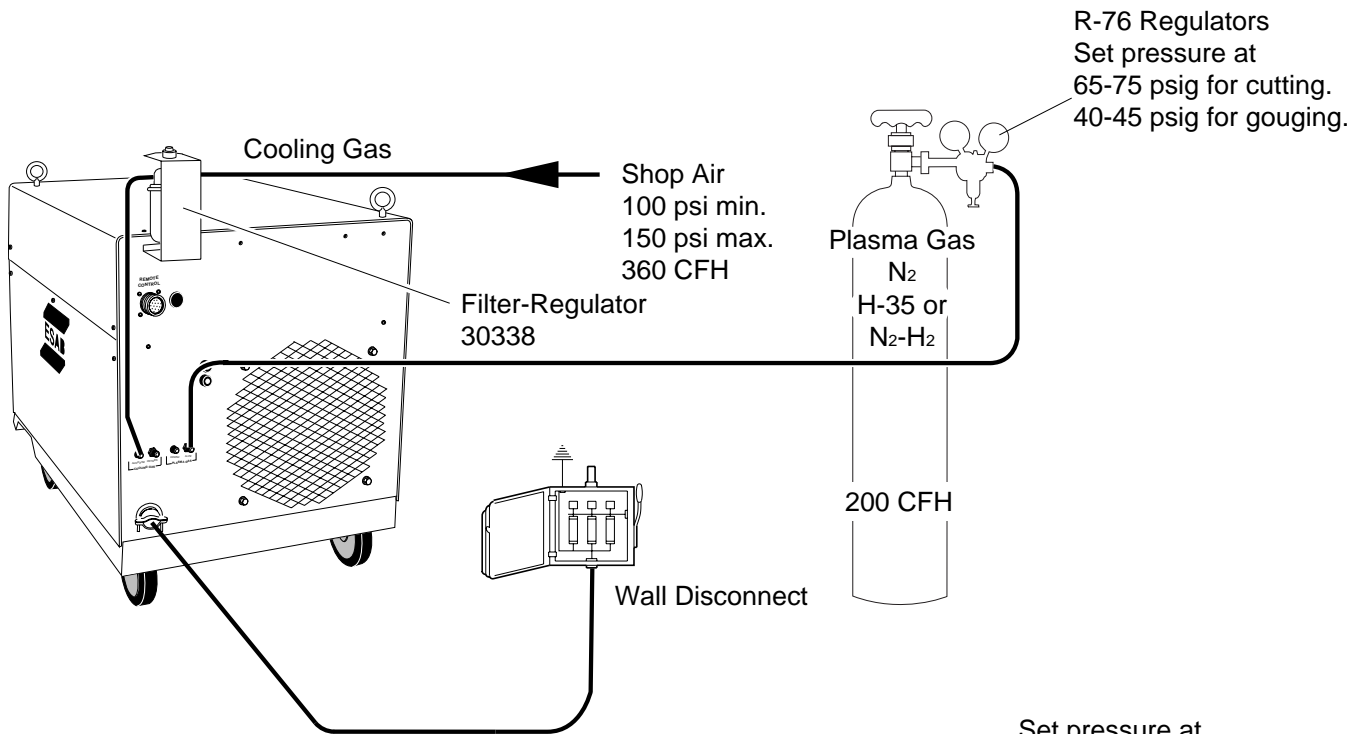




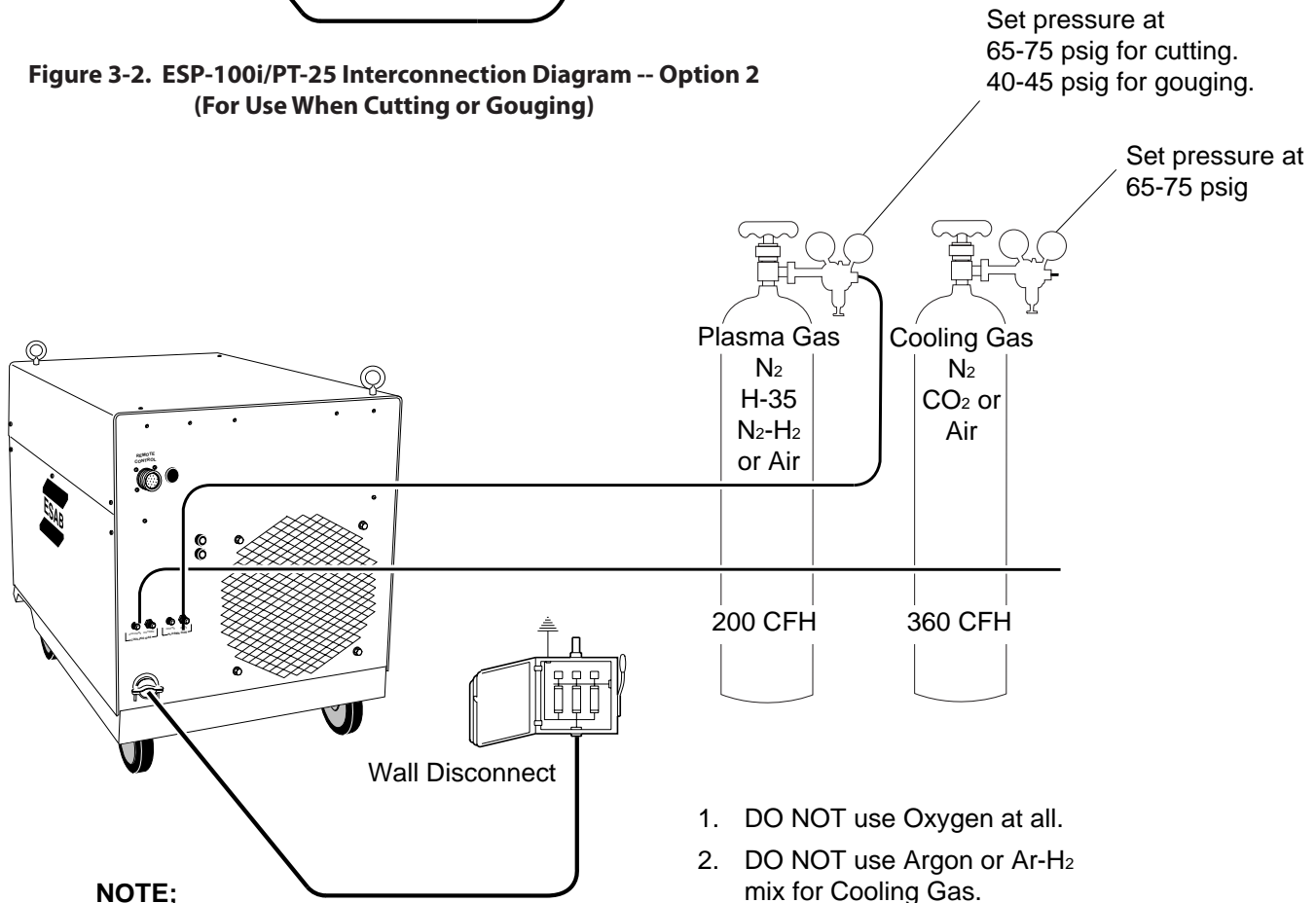
**Figure 3-2. ESP-100i/PT-25 Interconnection Diagram**



**Figure 3-2. ESP-100i/PT-25 Interconnection Diagram -- Option 1  
(For Use When Cutting Only; Not for Gouging)**



**Figure 3-2. ESP-100i/PT-25 Interconnection Diagram -- Option 2  
(For Use When Cutting or Gouging)**



**NOTE;**

This option will require a few cylinders manifolded or a bulk system to maintain flow requirements of torch.

1. DO NOT use Oxygen at all.
2. DO NOT use Argon or Ar-H<sub>2</sub> mix for Cooling Gas.

**Figure 3-2. ESP-100i/PT-25 Interconnection Diagram -- Option 3  
(For Use When Cutting or Gouging)**

### 3.5.1 Using PT-25 Torch. (Refer to figure 3-2.)

- A. With the right side panel removed, connect the terminal lug end of the work cable assembly to the WORK terminal in lower right corner behind front panel. Nut should be wrench-tight.
- B. Thread the four torch service lines through the bushing in the lower right corner of the front panel and proceed as follows: (1) Connect the plasma gas/power cable (large male nut with left hand threads) to the TORCH fitting and tighten firmly with a wrench; (2) Remove pilot arc adaptor (21803) shipped with console and connect cooling gas/pilot arc cable to the right-hand threaded PILOT ARC fitting and tighten firmly with a wrench; (3) Connect the 5-pin switch lead to the mating receptacle. Make sure plug is firmly locked in place. (4) Insert safety sensor tube into tube fitting until fully seated.
- C. Reinstall right side panel.
- D. Referring to the interconnection diagram (figure 3-2), connect the desired gas to the plasma and shield gas connections on the rear panel of the console. Note the various options shown in the diagram. Use only gases recommended as noted on the diagram.

## CAUTION

Do NOT use argon or argon mixtures as cooling gas in the PT-25 torch. Internal arcing in the torch head may occur.

Do NOT use oxygen as cooling or plasma gas. The torch may catch fire.

- E. Electrically connect work cable to workpiece. The connection must be made to a clean, exposed metal surface free of paint, rust, mill scale, etc. (See figure 3-4).



## WARNING

A poor connection or failure to connect work cable to workpiece can result in fatal shock.

- F. Make sure workpiece is connected to an approved earth ground. Use copper ground cable equal to or larger than the power source chassis ground listed in Table 3-1.

### 3.5.2 Using PT-20AM Torch. (Refer to figure 3-3.)

- A. With the right side panel removed, connect the terminal lug end of the work cable assembly to the WORK terminal in lower right corner behind front panel. Nut should be wrench-tight.
- B. Connect pilot arc adaptor P/N 21803 (supplied with console) to the PILOT ARC connection and tighten firmly with a wrench. Loosely place screw, washer, and lockwasher in the most convenient tapped hole in the adaptor.
- C. Thread the two torch service lines through the bushing in the lower right corner of the front panel and proceed as follows: (1) Connect the power cable (large male nut with left hand threads) to the TORCH fitting and tighten firmly with a wrench; (2) Connect pilot arc cable to the adaptor assembled on PILOT ARC fitting at the most convenient tapped hole position of adaptor. With washer and lockwasher in place, tighten screw firmly with a screwdriver.
- D. Reinstall right side panel.
- E. Assemble the filter-regulator and mounting bracket (30338) to the upper left corner on the rear panel (view from rear) as illustrated. Mounting holes are provided. Hardware is supplied with the mounting bracket.
- F. Connect the air hose assembly (678152) to filter-regulator outlet fitting and to the Air/N<sub>2</sub> plasma gas fitting on the rear panel of the ESP-100i unit. Note that the air hose has left-hand threaded nut on one end (regulator) and right-hand on the other.
- G. Connect your air supply to the inlet connection (1/4-in. NPT female - customer to supply suitable end fitting) of the filter-regulator.
- H. Electrically connect work cable to workpiece. The connection must be made to a clean, exposed metal surface free of paint, rust, mill scale, etc. (See figure 3-4).

**WARNING**

A poor connection or failure to connect work cable to workpiece can result in fatal shock.

- I. Make sure workpiece is connected to an approved earth ground. Use copper ground cable equal to or larger than the power source chassis ground listed in table 3-1.

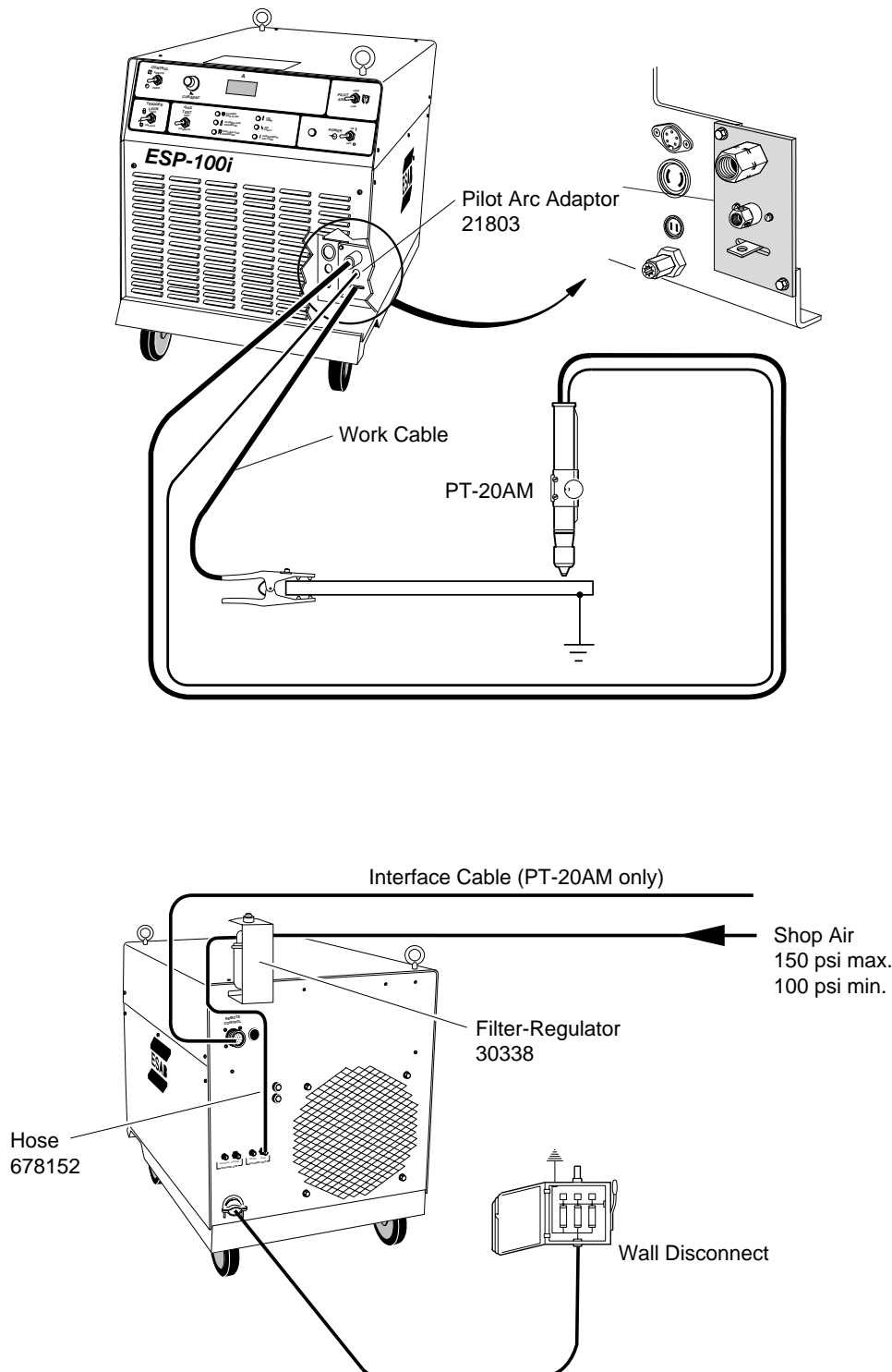
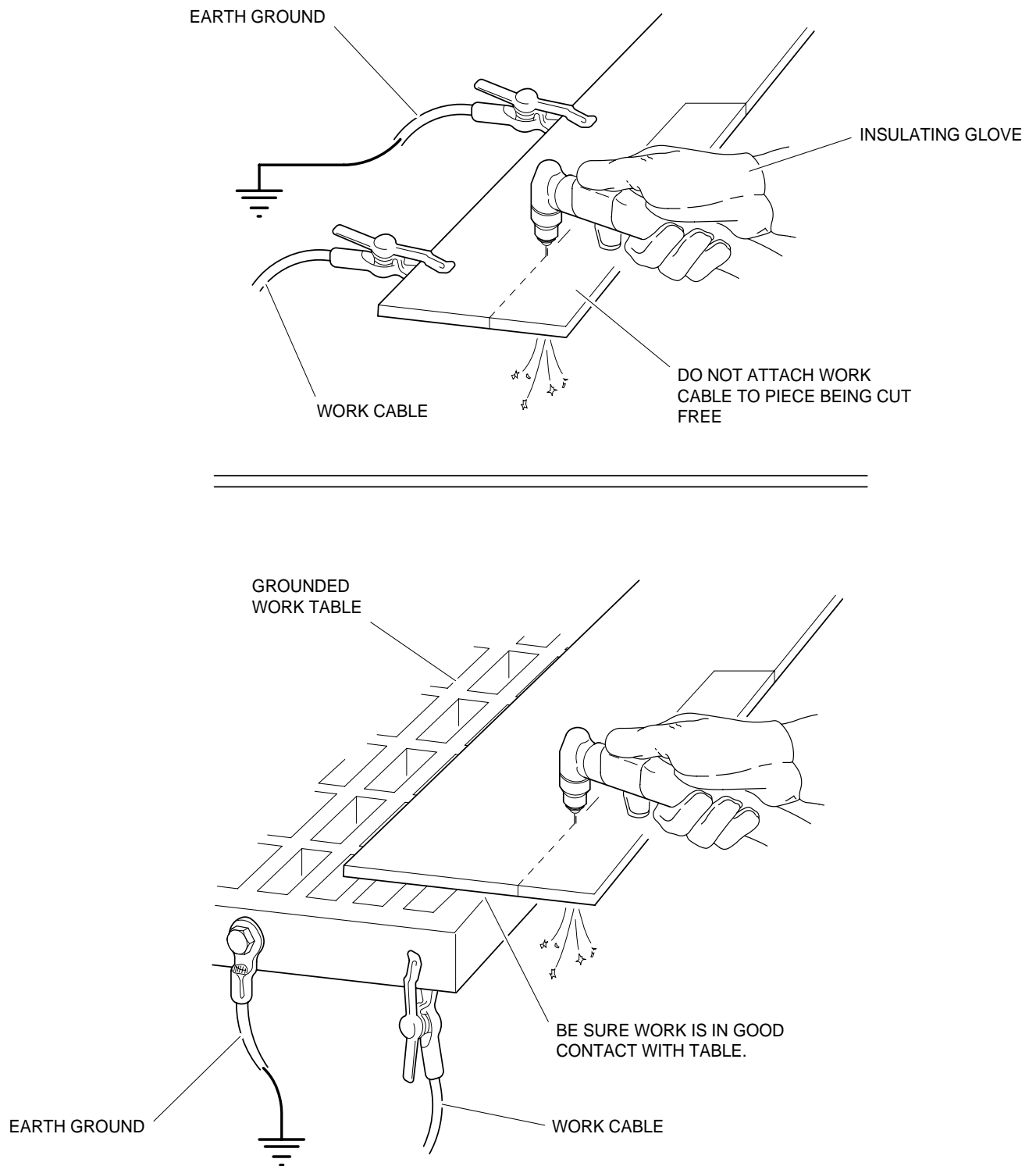


Figure 3-3. ESP-100i Interconnection Diagram



**Figure 3-4. Ground and Work Cable Connections**



## 4.1 OPERATION



**ELECTRIC SHOCK can kill.**

- Do NOT operate the unit with the cover removed.
- Do NOT apply power to the unit while holding or carrying the unit.
- Do NOT touch any torch parts forward of the torch handle (nozzle, heatshield, electrode, etc.) with power switch on.



**ARC RAYS can burn eyes and skin;  
NOISE can damage hearing.**

- Wear welding helmet with No. 6 or 7 lens shade.
- Wear eye, ear, and body protection.

## CAUTION

Position the ESP-100i at least 10 feet (3 meters) from the cutting area. Sparks and hot slag from the cutting operation can damage the unit.

## 4.2 ESP-100i CONTROLS (Figure 4-1.)

- A. Power On/Off Switch. Turns unit on/off.
- B. Power On Indicator. Indicates unit is on.
- C. Pilot Arc Current Selector Switch. In the low position (down) unit is used for cutting. In the high position (up) unit is used for gouging.
- D. Output Current Control Selector Switch. In the REMOTE position, output current is controlled through a 0-10 V remote current setting signal via a remote control connector (J1) on back panel. In the PANEL position, output current controlled by current adjustment knob on front panel.
- E. Trigger Lock. (Used only with manual torches.) In unlock position operator must depress torch switch to maintain an arc. In the lock position the torch will maintain an arc (once established) without depressing torch switch.
- NOTE:** The arc will extinguish ONLY by removing the torch away from the work.
- F. Gas Test Switch. In the TEST mode gas is supplied to torch for pressure adjustments. In the OPERATE mode, the unit is ready for operation.
- NOTE:** The Power Source fault indicator will illuminate due to the power source being locked out for operator safety.
- G. Digital Ammeter Readout. Indicates actual cutting current 0-100 amps.
- H. Plasma Gas Flow Fault Indicator. Indicates insufficient plasma gas flow to torch.
- I. Plasma Gas Pressure Fault Indicator. Indicates insufficient plasma gas pressure to torch.
- J. Cooling Gas Pressure Fault Indicator. Indicates insufficient cooling gas pressure to torch.
- NOTE:** Operator must check input gas into ESP-100i.
- K. Power Source Overtemperature Fault Indicator. Indicates power inlet breaker has opened due to thermal protection trip.
- L. P/S Fault Indicator. Illuminates during test mode.
- M. Over/Under Voltage Fault Indicator. Indicates applied input voltage is out of tolerance from the required input voltage.
- NOTE**
- Light will flash until unit power is cycled.





### 4.3 MANUAL CUTTING WITH THE PT-25

Use the following procedures to cut with the PT-25 torch. (Figures 4-2 thru 4-4).

Refer to the torch instruction manual F-15-266 for the proper way to setup the PT-25 for cutting or gouging.

The torch is now ready for cutting operations.



The torch front end components are designed to send a gas pressure signal to the console when the heat shield and nozzle are properly installed. This gas pressure signal operates in conjunction with circuits provided in the console. This patented system provides a safety interlock preventing the torch from being accidentally energized with high voltage when the heat shield is removed and the torch switch is accidentally closed. Occasionally check this system by removing the heat shield. Turn on console. Do NOT touch the metallic parts on the torch front end. Close the torch switch and place the electrode in contact with a properly grounded work piece. If the torch energizes and arcing occurs between the electrode and workpiece, do not use. Do NOT tamper with the torch or console. Return torch and console to your ESAB distributor for repair.



Wear the usual protective gloves, clothing, ear protection, and helmet. Helmet with filter lens shade No. 8 should provide adequate protection for your eyes.

Never touch any parts forward of the torch handle (cutting tip, heat shield, electrode, etc.) unless the POWER switch is in the OFF position.

- A. Position the torch on the workpiece by resting the stand-off guide on the edge of the workpiece where you intend to start the cut.
- B. Lower protective helmet and then lift the torch about 1/8-in. above the workpiece. (Not necessary to lift when using guard.)
- C. Push down on the torch switch button mounted on the torch handle. Main contactor will come on; gas will start flowing. Two seconds later, the pilot arc contactor and high frequency will energize. The cutting arc should then transfer to the workpiece.

#### NOTE

If cutting arc does not start within 5 seconds, the pilot arc will shut off. Release torch switch. Check to be sure gas pressures are adequate (particularly the cooling gas pressure), work cable is firmly connected to workpiece, torch was about 1/8 to 1/4-in. above workpiece, etc. Then start from step 1 again.

- D. For ease of operation, use the stand-off guide. If using the standard shield guard, maintain a stand-off (torch-to-work distance) of about 3/16-in. to 5/16-in. Keep the torch head at an angle of 5° to 15° leading (see figure 4-2), and move it at a rate that produces the desired cut quality (See figure 4-3). The cutting should produce a straight fine spray of molten metal emitting from beneath the workpiece.
- E. If cutting arc is lost during cut, the pilot arc will immediately reignite as long as the torch switch is depressed. You then have about 5 seconds to move the torch close enough to work to reestablish the cutting arc.
- F. The cutting arc will extinguish at the end of the cut; however, the torch switch should be released to keep the pilot arc from reigniting.
- G. When cutting operation is completed, wait a few minutes before placing the POWER switch to the OFF position so that the cooling fan has time to remove the heat from the unit. Then shut off the primary power at the main disconnect switch.

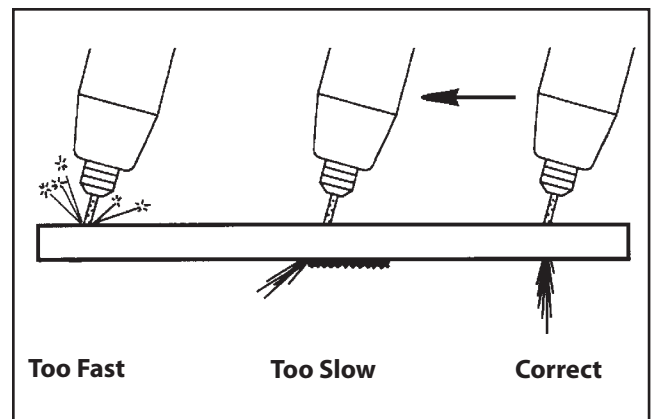
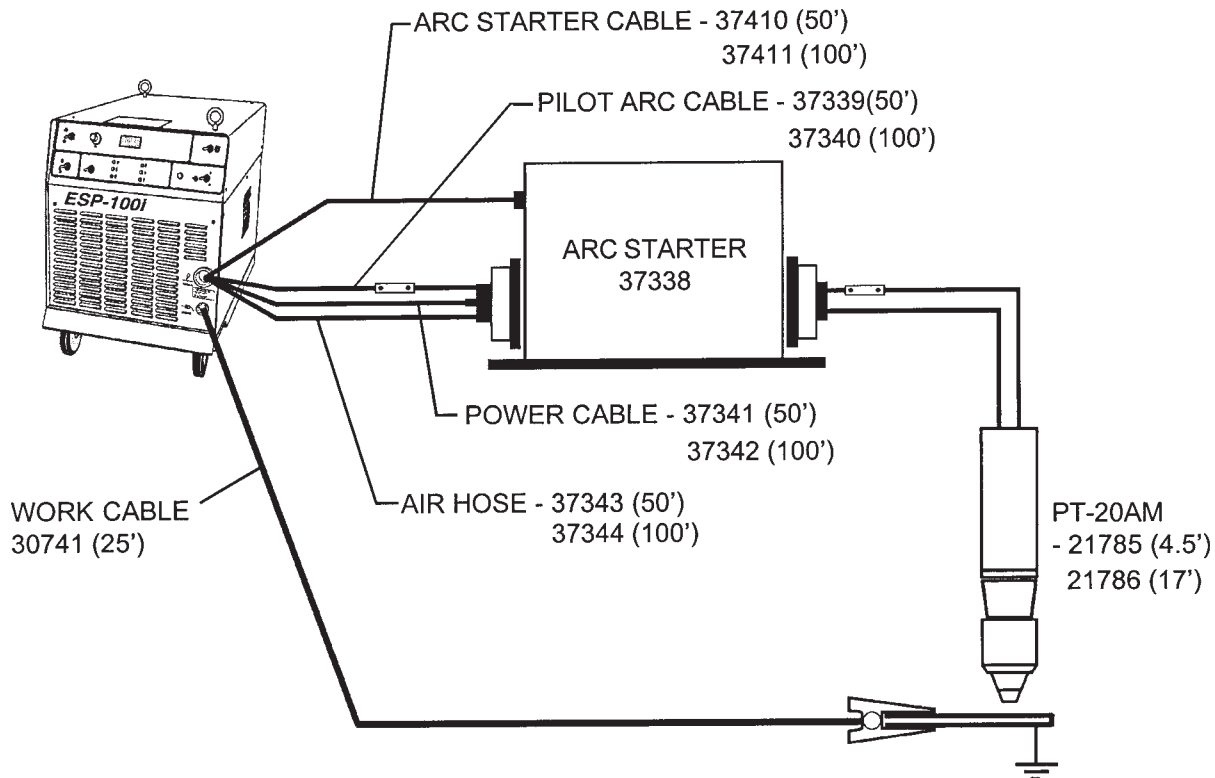
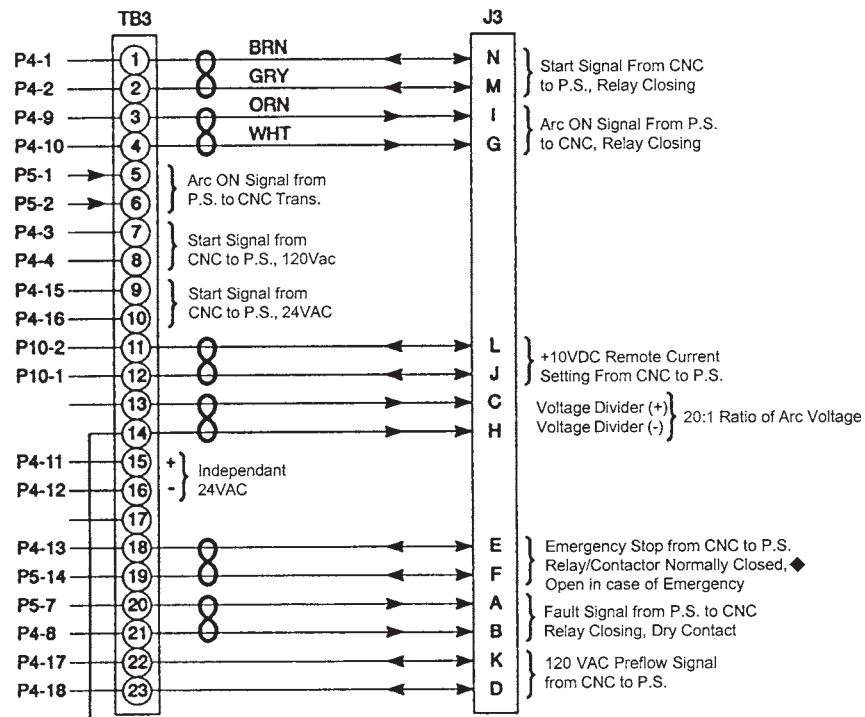


Figure 4-3. Effect of Cutting Speed



**Schematic - Mechanized System Setup**  
(See Figure 4-5 for connections)



♦ **NOTE:** If CNC does not have a normally closed Emergency switch - a jumper must be installed between TB3-18 and TB3-19.

**Figure 4-4. Mechanized Cutting Interface Diagram**

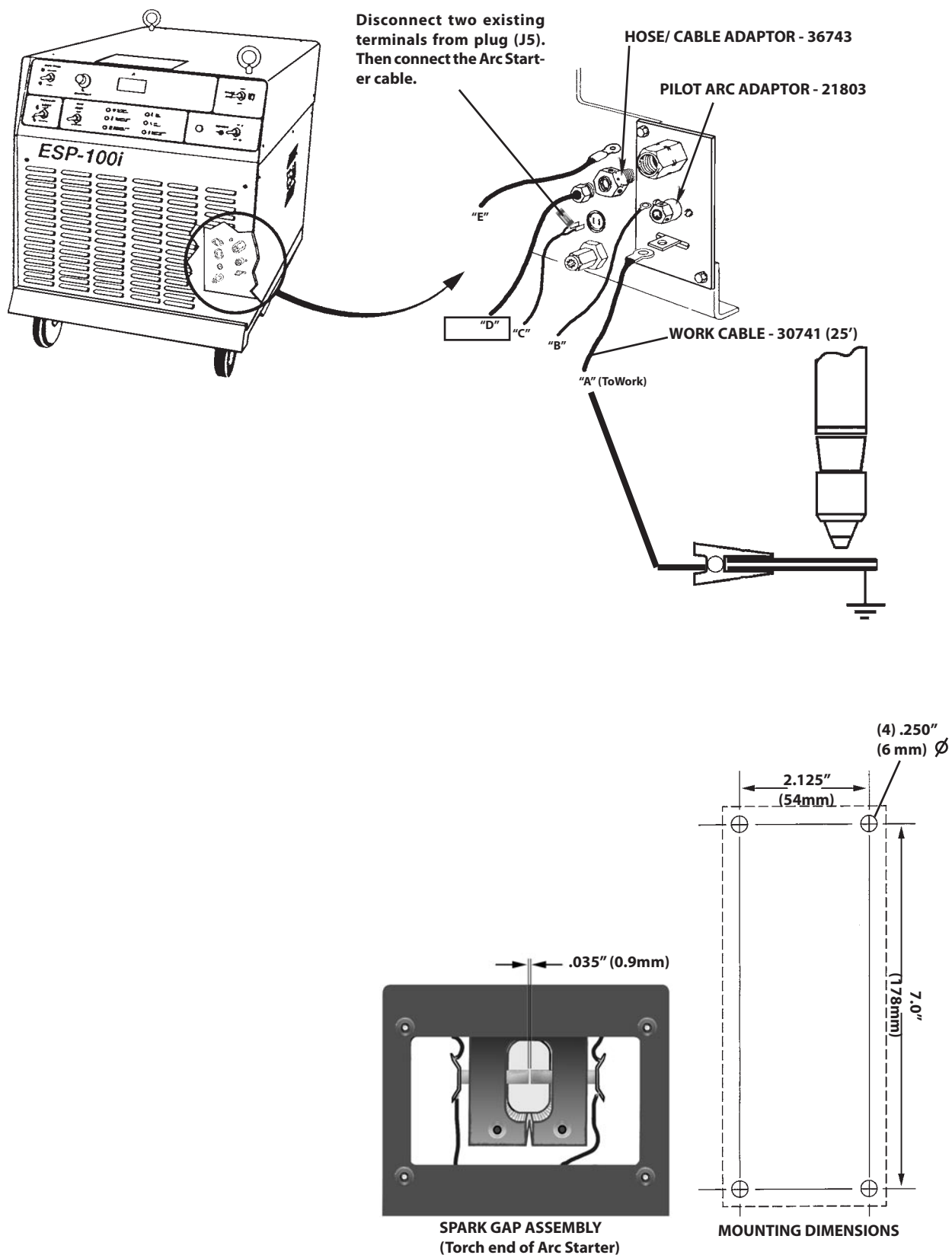


Figure 4-5. Connection Diagram - ESP-100i/PT-20AM with Arc Starter

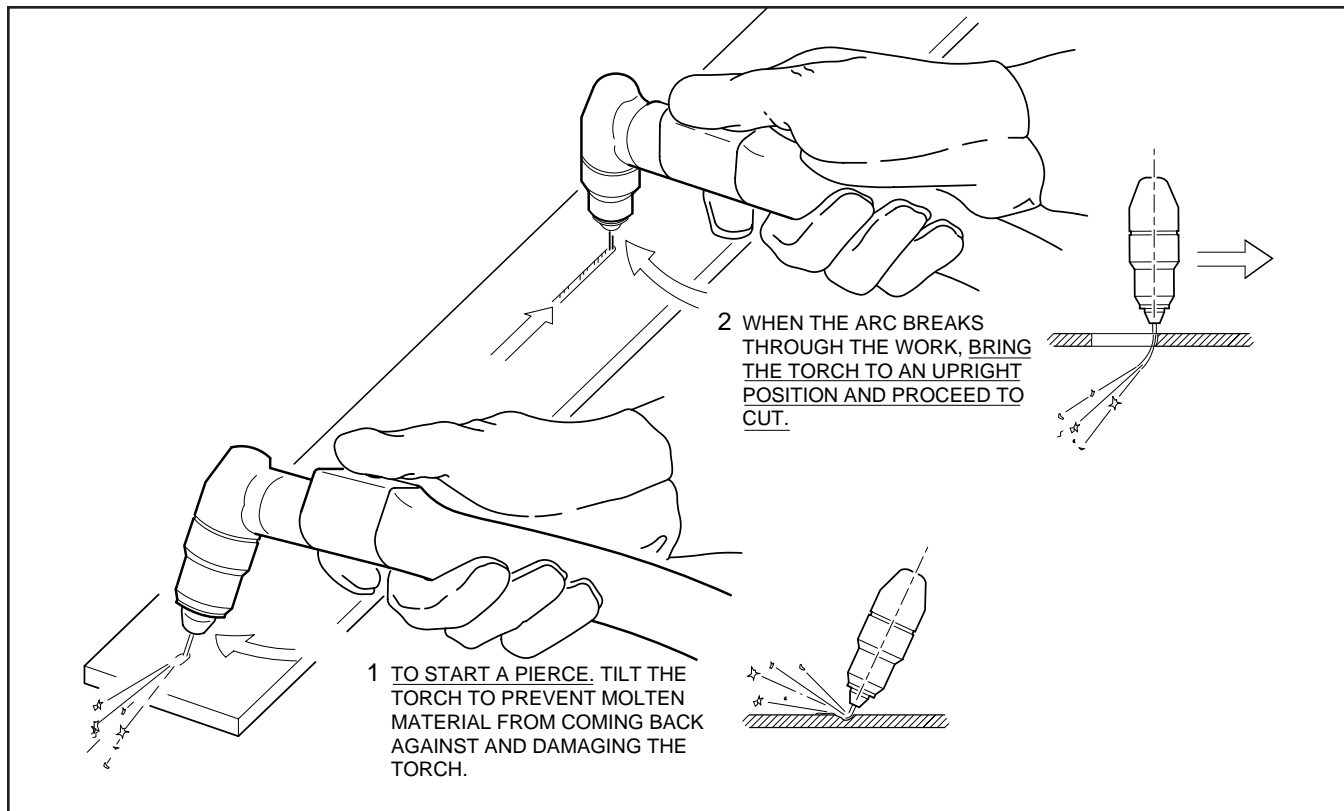


Figure 4-6. Typical Piercing Technique

## 4.5 COMMON CUTTING PROBLEMS

Listed below are common cutting problems followed by the probable cause of each. If problems are determined to be caused by the ESP-100i, refer to the maintenance section of this manual. If the problem is not corrected after referring to the maintenance section, contact your ESAB representative.

### A. Insufficient Penetration.

1. Cutting speed too fast.
2. Damaged cutting nozzle.
3. Improper air pressure.

### B. Main Arc Extinguishes.

Cutting speed too slow.

### C. Dross Formation. (In some materials and thicknesses, it may be impossible to get dross-free cuts.)

1. Cutting speed too fast or too slow.
2. Improper air pressure.
3. Faulty nozzle or electrode.

### D. Double Arcing. (Damaged Nozzle Orifice.)

1. Low air pressure.

### 2. Damaged cutting nozzle.

### 3. Loose cutting nozzle.

### 4. Heavy spatter.

### 5. Nozzle touches work while cutting.

### E. Uneven Arc.

Damaged cutting nozzle or worn electrode.

### F. Unstable Cutting Conditions.

1. Incorrect cutting speed.
2. Loose cable or hose connections.
3. Electrode and/or cutting nozzle in poor condition.

### G. Main Arc Does Not Strike.

1. Front panel fault light tripped.
2. Loose connections.
3. Work clamp not connected.
4. Cooling gas pressure not sufficient
5. Torch safety connection not connected.

### H. Poor Consumable Life.

1. Improper gas pressure.
2. Contaminated air supply.
3. Improper gas/electrode combination.

## 5.1 GENERAL

If this equipment does not operate properly, stop work immediately and investigate the cause of the malfunction. Maintenance work must be performed by an experienced person, and electrical work by a trained electrician. Do not permit untrained persons to inspect, clean, or repair this equipment. Use only recommended replacement parts.



Be sure that the wall disconnect switch or wall circuit breaker is open before attempting any inspection or work inside of the ESP-100i.

## 5.2 INSPECTION AND CLEANING

Frequent inspection and cleaning of the ESP-100i is recommended for safety and proper operation. Some suggestions for inspecting and cleaning are as follows:

- A. Check work cable to workpiece connection.
- B. Check safety earth ground at workpiece and at power source chassis.
- C. Check heat shield on torch. It should be replaced if damaged.
- D. Check the torch electrode and cutting nozzle for wear on a daily basis. Remove spatter, sharpen point, or replace if necessary.
- E. Make sure cable and hoses are not damaged or kinked.
- F. Make sure all plugs, fittings, and ground connections are tight.

## CAUTION

Water or oil occasionally accumulates in compressed air lines. Be sure to direct the first blast of air away from the equipment to avoid damage to the ESP-100i.

- G. With all input power disconnected, and wearing proper eye and face protection, blow out the inside of the ESP-100i using low-pressure dry compressed air.

- H. Occasionally, bleed all water from the filter beneath the air filter-regulator.

## 5.3 TORCH CONSUMABLE PARTS



Make sure power switch on ESP-100i is in OFF position before working on the torch.

Refer to the following torch booklets for maintenance, replacement parts, and additional information:

<u>Torch</u>	<u>Booklet</u>
PT-25	F-15-266
PT-20AM	F-15-114

## 5.4 PREFLOW CONTROL

- A. With manual torches: Preflow can be adjusted between 1 and 4 seconds by using SW2 on the main control pc board (PCB1), P/N 38020.
- B. With mechanized torch and with power source controlling preflow, place jumper J1 on interface pc board (PCB4), P/N 38098.
- C. With mechanized torch and with Computer Numerical Control (CNC) controlling preflow, remove jumper J1 from interface pc board (PCB4), P/N 38098.

## 5.5 FLOW SWITCH (Figure 5-1.)

When excessive contamination is found in the air, the flow switch (FS-4 or FS-5) in the ESP-100i should be disassembled and cleaned as follows:

### NOTE

It is not necessary to remove the flow switch from the system for cleaning.

- A. Ensure the system is shut down and there is no trapped air under pressure in the piping.
- B. Remove the piston plug.
- C. Remove the spring (FS-4 only). Use care when handling spring to prevent distortion.

- D. Remove the piston.
- E. Clean all parts with cleaning agent.

### 5.6 ADJUSTMENT OF GAS PRESSURE SWITCH (Figure 5-2.)

The cooling gas pressure switch is factory set for 55 psig minimum; plasma gas pressure switch is factory set for 40 psig minimum. If required, the pressure switch can be custom set to provide precise control of the cooling gas and plasma gas pressure. The two switches are located in the rear of the ESP-100i. To access the switches, remove the right cover.

To **INCREASE** pressure: turn the gas pressure switch counterclockwise.

To **DECREASE** gas pressure: turn the gas pressure switch clockwise.

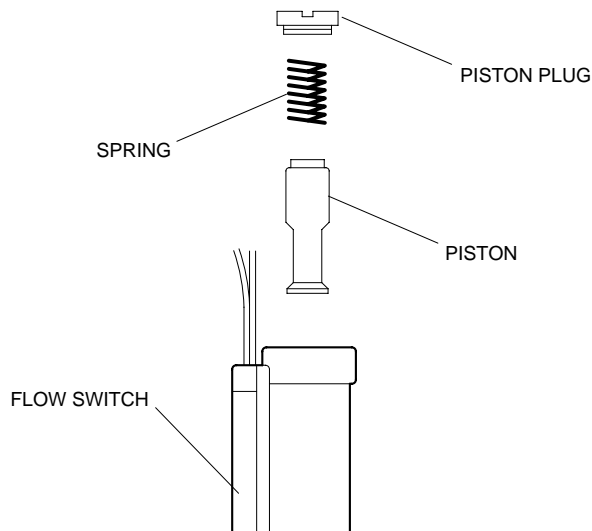


Figure 5-1. Disassembly/Assembly of Flow Switch

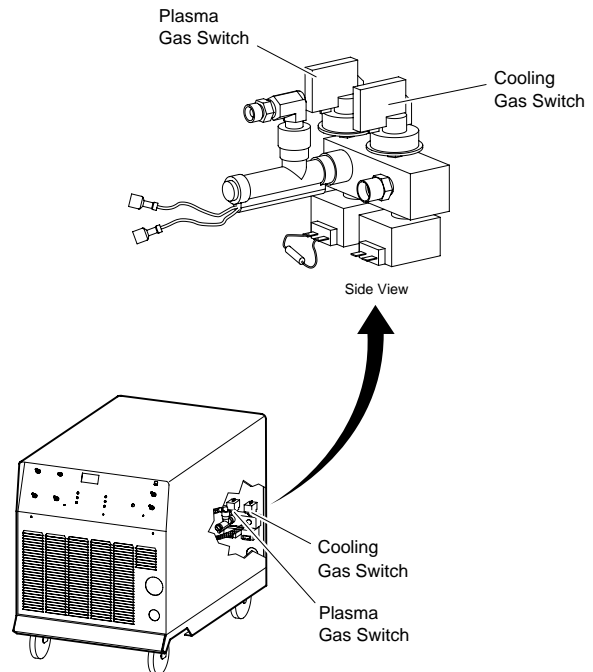


Figure 5-2. Gas Pressure Switch

## 6.1 TROUBLESHOOTING



**ELECTRIC SHOCK CAN KILL!** Be sure that all primary power to the machine has been externally disconnected. Open the line (wall) disconnect switch or circuit breaker before attempting inspection or work inside of the power source.



Capacitors are capable of storing high voltages even when power is disconnected or unit is deenergized. Ensure power supply capacitors are grounded prior to performing maintenance.

a simple visual inspection of all the components and wiring. Check for secure terminal connections, loose or burned wiring or components, bulged or leaking capacitors, or any other sign of damage or discoloration.

The cause of control malfunctions can be found by referring to the schematic diagram (figures 6-1) and wiring diagram (figure 6-2) and checking the various components. A volt-ohmmeter will be necessary for some of these checks.



Voltages in plasma cutting equipment are high enough to cause serious injury or possibly death. Be particularly careful around equipment when the covers are removed.

**NOTE**

Before checking voltages in the circuit, disconnect the power from the high frequency generator to avoid damaging your voltmeter.

## 6.2 TROUBLESHOOTING PROCEDURES

Check the problem against the symptoms in the following troubleshooting guide, table 6-1. The remedy may be quite simple. If the cause cannot be quickly located, shut off the input power, open up the unit, and perform

Table 6-1. Troubleshooting Guide

PROBLEM	POSSIBLE CAUSE	ACTION
I. Power switch is in the ON position but fan is not running.	I. If Power-ON indicator light is ON:  a) Broken or disconnected wire in the fan motor circuit.  b) Faulty fan.	a) Repair wire.  b) Replace the fan motor.
	II. If Power-ON indicator light is OFF:  a) Broken or disconnected wires to the Power-ON/OFF switch.  b) Power is not connected properly to the input of the auto transformer and/or the jumper.	a) Repair wire.  b) Correct input power connections.

Table 6-1. Troubleshooting Guide - (Cont)

PROBLEM	POSSIBLE CAUSE	ACTION
<p>2 If power switch is ON, fan is running, and power indicator is ON but:</p> <p>a) Plasma gas pressure fault indicator is ON.</p> <p>b) Cooling gas pressure fault indicator is ON.</p> <p>c) Power source temperature fault indicator is ON (happened if unit was being used previously).</p> <p>d) Over/under voltage fault indicator is ON.</p> <p>e) Power source fault indicator is ON.</p>	<p>a) Insufficient plasma gas pressure to the unit.</p> <p>b) Insufficient cooling gas pressure to the unit.</p> <p>c) (1) Insufficient ventilation at the rear end of the unit.</p> <p>(2) One or both side covers removed.</p> <p>(3) Broken wire on one or two thermal switches.</p> <p>d) Input voltage is above or under 15% of the rated voltage connection to the unit.</p> <p>e) Gas Test Switch is in Test position.</p>	<p>a) Increase the cooling gas pressure or remove restrictions in the gas flow.</p> <p>b) Increase the cooling gas pressure or remove restrictions in the gas flow.</p> <p>c) (1) Leave at least 2' between the back of the unit and the wall for proper air circulation.</p> <p>(2) Install and secure both side covers.</p> <p>(3) Repair wires.</p> <p>d) Correct the input voltage and recycle the power to the unit.</p> <p>e) Set Gas Test Switch to OPERATE position.</p>
<p>3. Depress torch switch or send start signal but:</p> <p>a) Plasma gas flow fault indicator comes ON (only in single gas and PT-20AM applications).</p> <p>b) No pilot arc or main arc established.</p>	<p>a) Insufficient plasma gas pressure or restricted gas flow.</p> <p>(If used with a manual torch:)</p> <p>b) (1) Current setting switch is in the remote position.</p> <p>(2) Current dial is set too low.</p> <p>(3) Cooling gas pressure is too low to operate safety system.</p> <p>(4) Torch safety connection is not connected to power source.</p>	<p>a) (1) Increase gas pressure.</p> <p>(2) Remove restrictions in the gas flow.</p> <p>b) (1) Correct current setting switch to panel position.</p> <p>(2) Increase the current setting.</p>



Table 6-1. Troubleshooting Guide - (Cont)

PROBLEM	POSSIBLE CAUSE	ACTION
	(If used with a mechanized torch and remote current setting signal:)  b) (1) Current setting switch is in the panel position.  (2) Current setting 0-10 V dc signal is missing.	b) (1) Correct current setting switch to remote position.  (2) Check for 0-10 V dc current setting signal.
4. Arc does not transfer to work.	(If open circuit voltage is okay between 300-325 V dc and there is pilot arc:)  a) Open connection between the power source positive output and the work.  b) Power source work clamp not properly connected to workpiece.	a) Repair connection.  b) Make work clamp connection to clean bare metal of workpiece.
	(If open circuit voltage is okay but there is no pilot arc:)  b) (1) Pilot arc fuse F1 or F2 or both are open.  (2) Faulty pilot arc contactor.  (3) Faulty control PCB.  (4) Preflow control is not given to the CNC.	b) (1) Replace fuse(s).  (2) Replace pilot arc contactor.  (3) Replace PCB #1 P/N 38020.  (4) Remove jumper J1 from the interface control PCB P/N 38048.

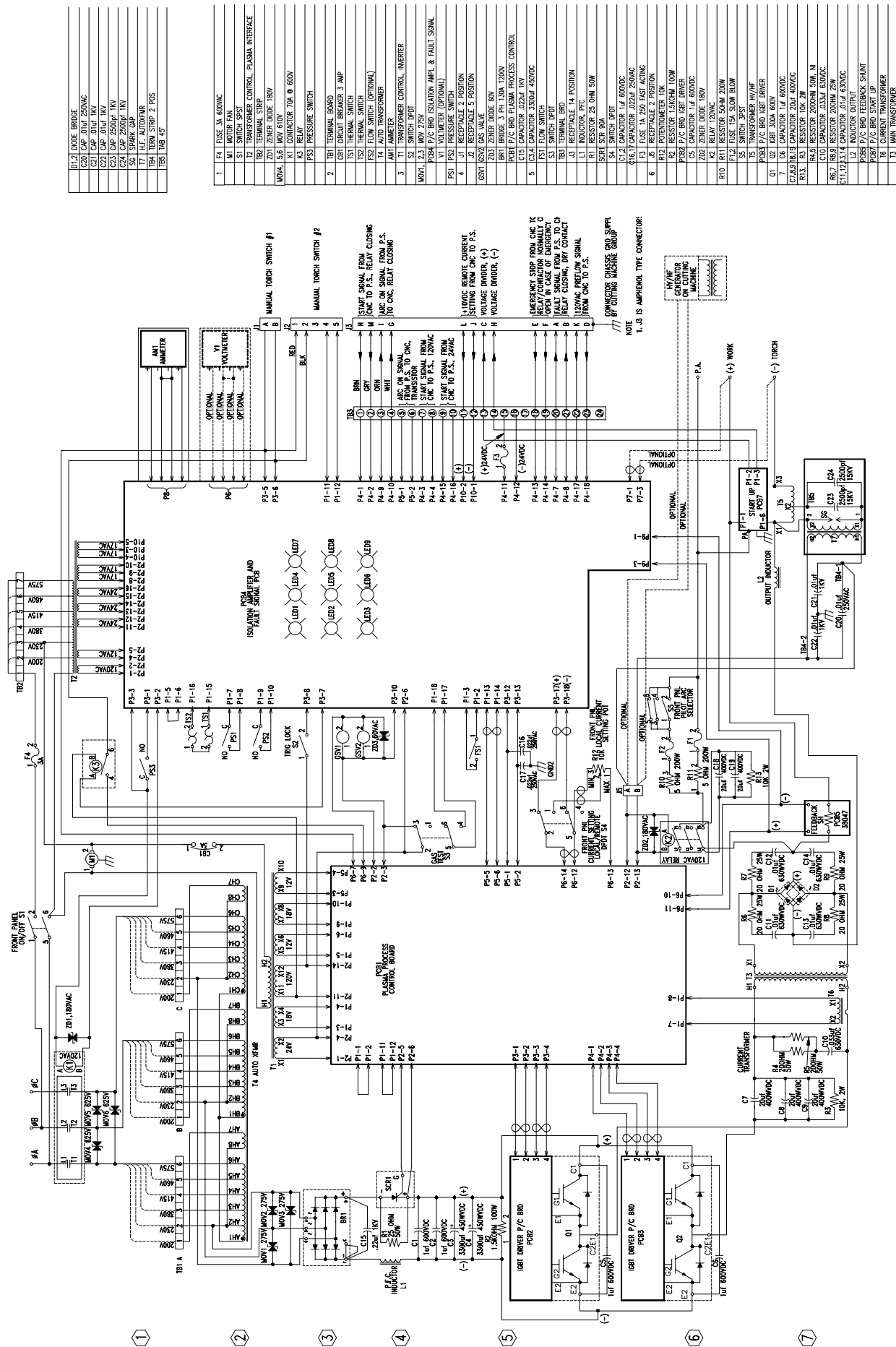
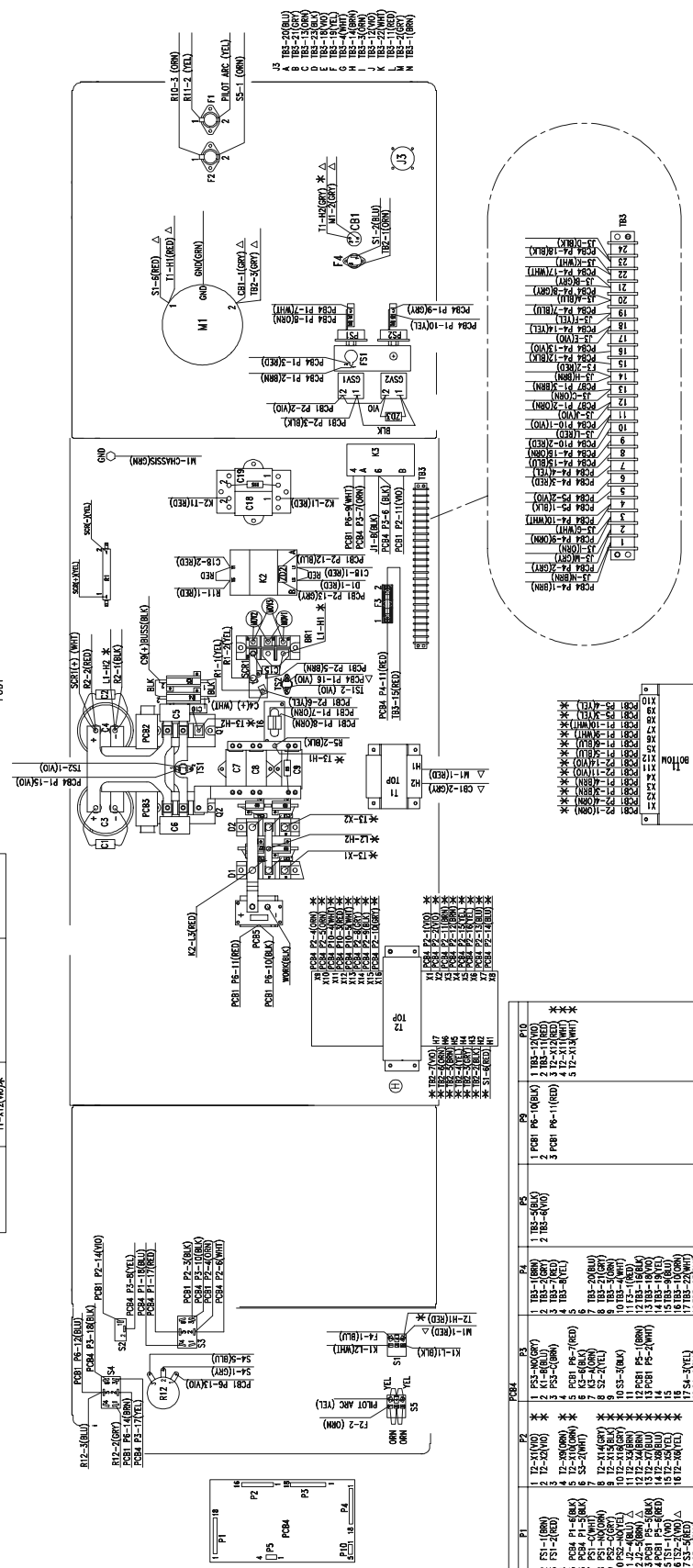
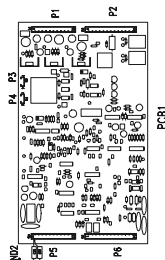


Figure 6-1. ESP-100i Schematic Diagram



NOTES:  
1- \* DENOTES SELF LEADS.  
2- Δ DENOTES SPLICE

### Figure 6-2. ESP-100i Wiring Diagram (Sheet 1 of 2)

44

## **7.1 GENERAL**

Replacement parts are illustrated in figures 7-1 thru 7-6.

Always provide the series or serial number of the unit on which the parts will be used. The serial number is stamped on the unit nameplate.

## **7.2 ORDERING**

To assure proper operation, it is recommended that only genuine ESAB parts and products be used with this equipment. The use of non-ESAB parts may void your warranty.

Replacement parts may be ordered from your ESAB distributor or from:

**ESAB Welding & Cutting Products**  
Attn: Customer Service Dept.  
PO Box 100545, Ebenezer Road  
Florence, SC, 29501-0545

Be sure to indicate any special shipping instructions when ordering replacement parts.

Refer to the Communication Guide located on the last page of this manual for a list of customer service phone numbers.

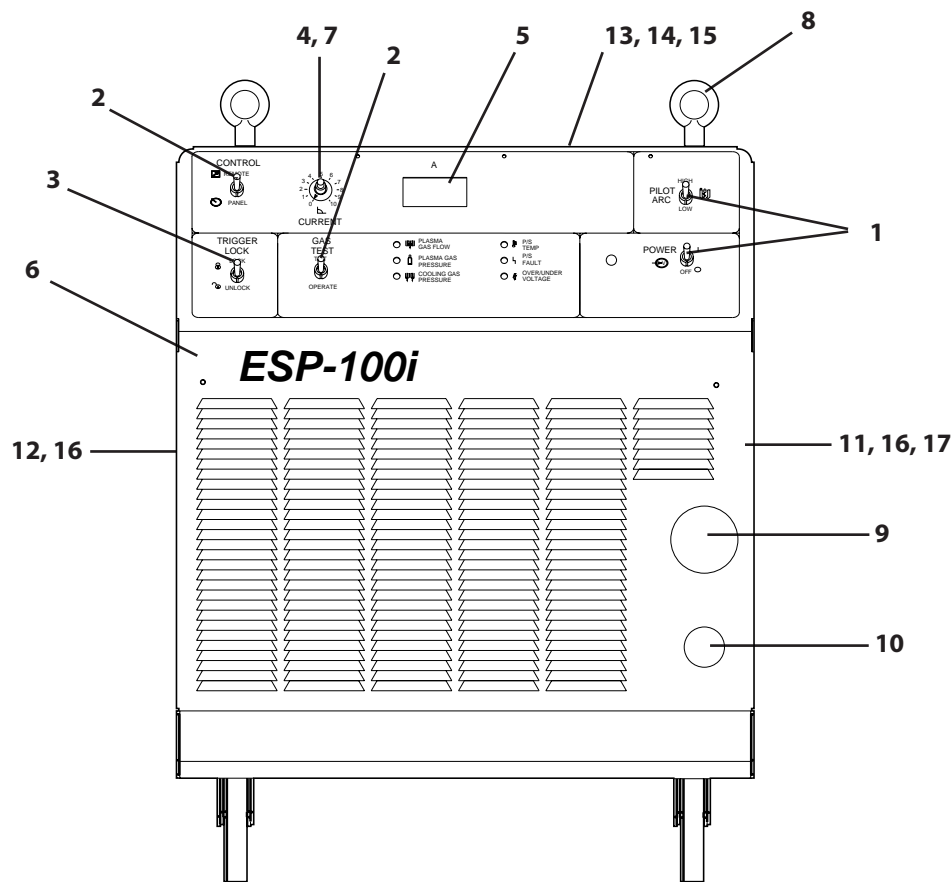


Figure 7-1. ESP-100i Front View

ITEM NO.	QTY REQ.	PART NO.	DESCRIPTION	CIRCUIT SYMBOL
1	1	672508	SWITCH TOGGLE 3 PST (SEAL - 951474)	S1, S5
2	1	634518	SWITCH TOGGLE DPDT (SEAL - 951474)	S3, S4
3	1	673213	SWITCH TOGGLE SPST (SEAL - 951474)	S2
4	1	13730611	KNOB	
5	1	951061	METER, LED	AM1
6	1	32197	PANEL, FRONT (CONTROL LABEL - 954484)	
7	1	2062018	POTENTIOMETER, 10K 2W	R12
8	2	952080	BOLT, EYE, 3/8" - 16 X 1"	
9	1	950518	GROMMET, 2.12" I.D.	
10	1	950167	GROMMET, 1.12" I.D.	
11	1	35687YL	PANEL, RIGHT SIDE	
12	1	35686YL	PANEL, LEFT SIDE	
13	1	35689YL	COVER, TOP	
14	1	2091514	DECAL, WARNING	
15	1	954558	LABEL, CAUTION LIFTING	
16	2	13734588	DECAL, ESAB	
17	1	995227	LABEL, WARNING EXPOSED TERMINAL	

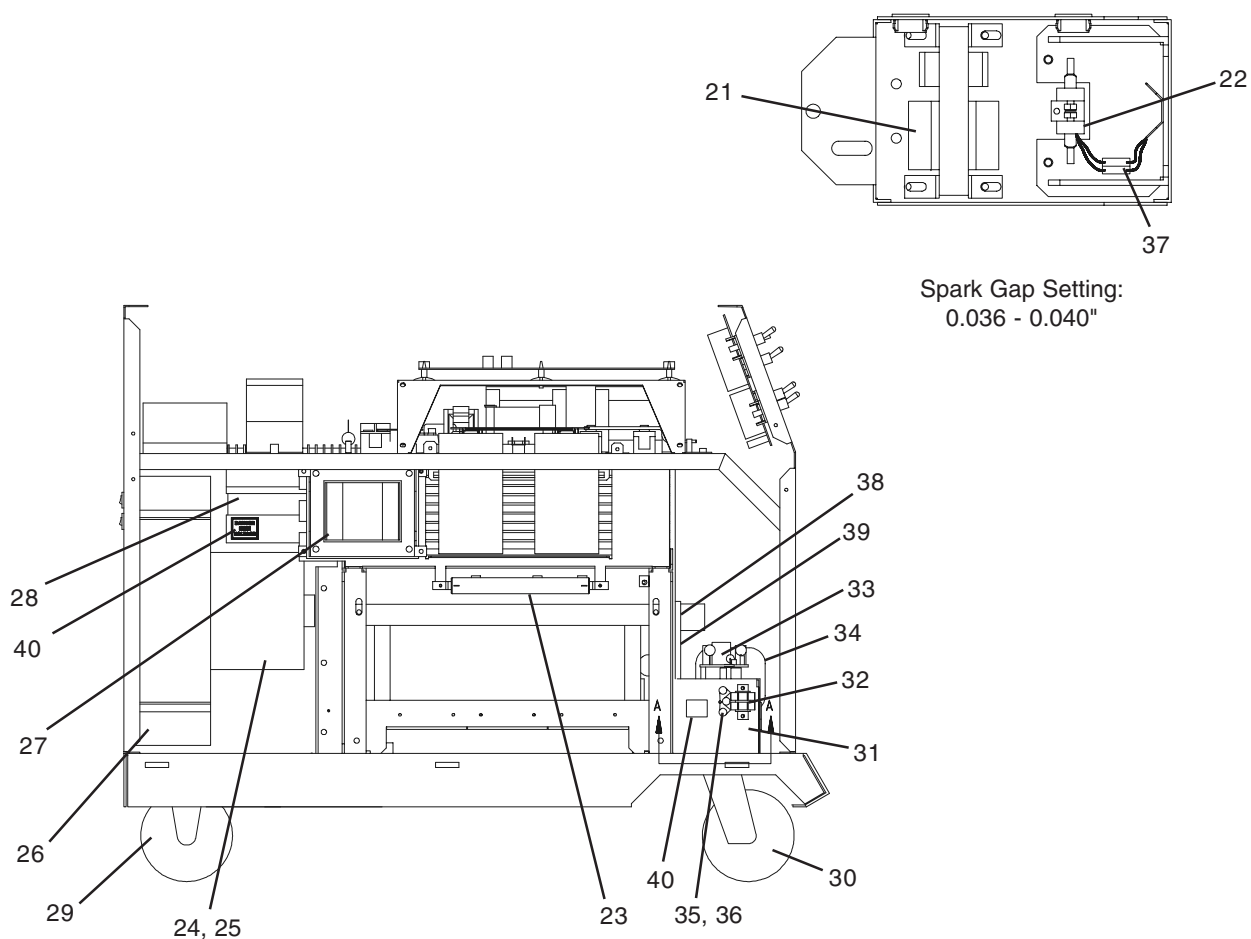


Figure 7-2. ESP-100i Left Side View

ITEM NO.	QTY REQ.	PART NO.	DESCRIPTION	CIRCUIT SYMBOL
21	1	951179	XFMR HIGH VOLTAGE	T7
22	1	0558001180	SPARK GAP ASSY. includes (2) electrodes	SG
23	1	17280215	RESISTOR 1.5 KOHMS, 100W	R2
24	1	672058	BLADE, FAN	
25	1	2062334	MOTOR, FAN	M1
26	1	672002GY	SHROUD, FAN	
27	1	35700	INDUCTOR, P.F.	L1
28	1	952015	RESISTOR, PILOT ARC, 5 OHM 200W	R10, 11
29	2	952012	CASTER, FIXED	
30	2	952013	CASTER, SWIVEL	
31	1	37251	BOX, HI FREQ.	
32	1	950487	TERM. STRIP 2 POS.	TB4
33	1	38131	PC BOARD ASSY. START UP	PCB7
34	1	37250	HI FREQ REACTOR	T5
35	1	952204	CAPACITOR 0.01uf 250VAC	C20
36	2	672348	CAPACITOR 0.01uf 1KV	C21, 22
37	2	951342	CAPACITOR 2500pf 1KV	C23, 24
38	1	997830	RECEPTACLE 5 POLE	J2
39	1	182W64	CONNECTOR TWIST LOCK	J1
40	2	23604891	LABEL WARNING HI VOLTAGE	

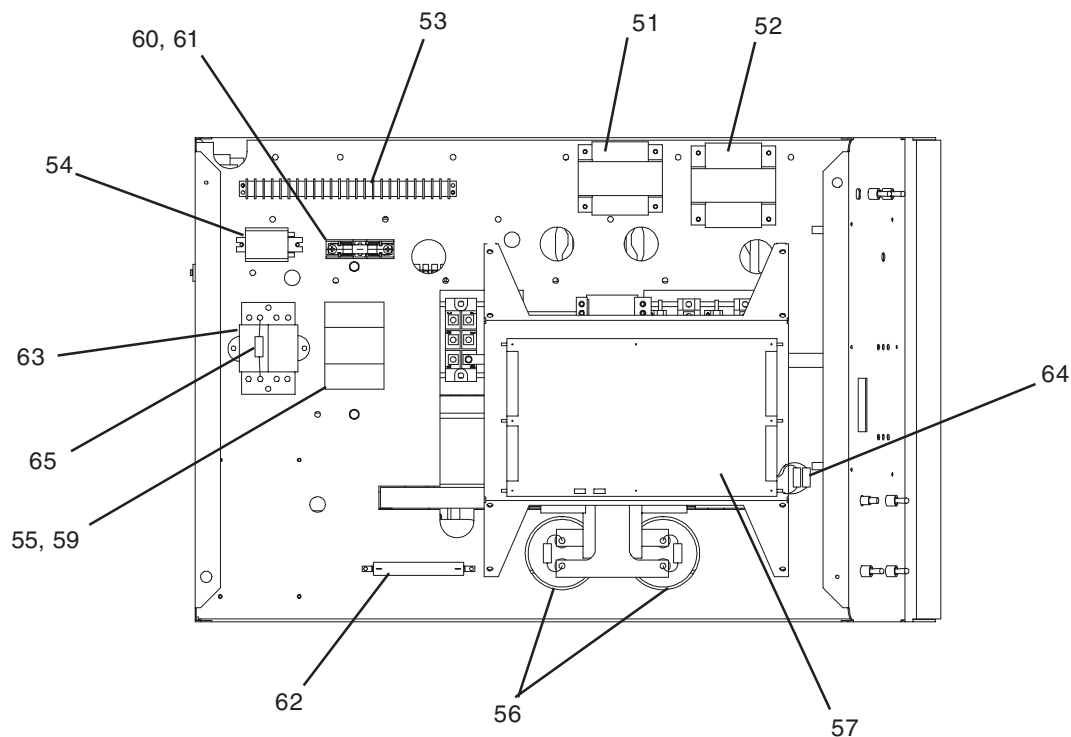


Figure 7-3. ESP-100i Top View with Top Cover Removed

ITEM NO.	QTY REQ.	PART NO.	DESCRIPTION	CIRCUIT SYMBOL
51	1	32914	TRANSFORMER ASSEMBLY, CONTROL	T1
52	1	35679	TRANSFORMER ASSEMBLY, CONTROL	T2
53	1	995103	TERMINAL STRIP, 24 POSITION	TB3
54	1	13735308	RELAY ENCLOSURE DPDT 120VAC, 20A	K3
55	1	950368	PILOT ARC CONTACTOR	K2
56	2	951983	CAPACITOR, 3300 $\mu$ F	C3, 4
57	1	38020	PC BOARD (used prior to Nov 07 - see change instructions in back if replacing with 38214 PCB)	PCB1
	1	38214	PC BOARD (used after 15 Nov 07)	
58	2	951028	CAPACITOR, 1 $\mu$ F 630 VDC	C1, 2
59	1	952051	DIODE, ZENER, 180V	ZD2
60	1	96W10	HOLDER, FUSE	
61	1	2017483	FUSE 1A 250V FAST ACTING	F3
62	1	99512078	RESISTOR 25 OHM 50W	R1
63	2	951161	CAPACITOR, 20 $\mu$ F, 400 VDC	C18, 19
64	2	951469	CAPACITOR, .022 $\mu$ F 250 VAC	C16, 17
65	1	17140310	RESISTOR, 2W 10K	R13



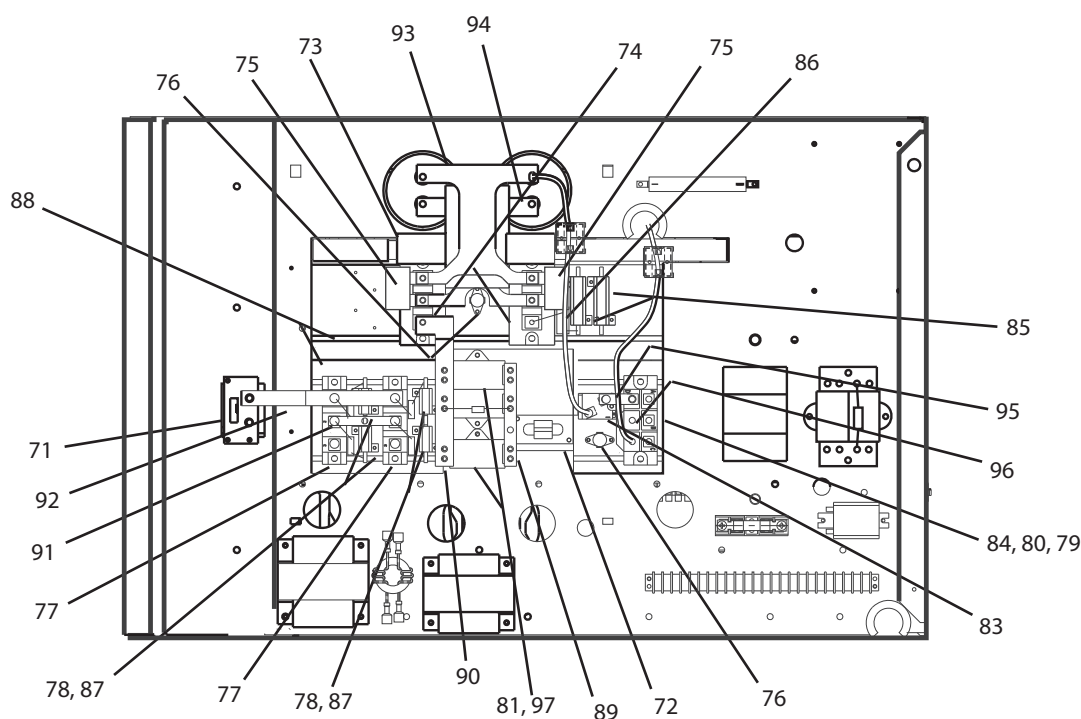


Figure 7-4. ESP-100i Top View (PCB1 Removed)

ITEM NO.	QTY REQ.	PART NO.	DESCRIPTION	CIRCUIT SYMBOL
71	1	38047	SHUNT, FEEDBACK	PCB5
72	1	32958	TRANSFORMER, CURRENT	T6
73	2	38052	PC BOARD ASSEMBLY IGBT DRIVER	PCB2,3
74	2	951980	IGBT (PAD - 951191)	Q1, Q2
75	2	951940	CAPACITOR, 1 $\mu$ F 600VDC	C5, 6
76	2	950711	SWITCH, THERMAL	TS1, 2
77	2	951185	MODULE DIODE 100A 600V (PAD - 951518)	D1, D2
78	4	17721020	RESISTOR, 20 OHM 25W (PAD - 951193)	R6, 7, 8, 9
79	3	951321	VARISTOR, METAL OX. 275V	MOV1, 2, 3
80	1	2062282	CAPACITOR .22 $\mu$ F 1000VDC	C15
81	3	951161	CAPACUTIR 29 $\mu$ F, 400 VDC	C7, 8, 9
82	1	35791	BUSBAR CAPACITOR	
83	1	951979	SCR (PAD - 951196)	SCR 1
84	1	951978	BRIDGE DIODE (PAD - 951192)	BR1
85	2	17750020	RESISTOR 20 OHM, 50W (PAD - 951194)	R4, 5
86	1	951828	CAPACITOR, 0.033 $\mu$ F, 630 VDC	C10
87	4	951313	CAPACITOR 0.01 $\mu$ F 630W VDC	C11, 12, 13, 14
88	2	951981	HEATSINK	
89	1	35791	BUSBAR CAPACITOR	
90	1	35787	BUSBAR CAPACITOR/IGBT	
91	1	35788	BUSBAR OUTPUT BRIDGE	
92	1	35789	BUSBAR OUTPUT BRIDGE/SHUNT	
93	1	35792	BUSBAR IGBT (+)/CAPACITOR	
94	1	35793	BUSBAR IGBT (-)/CAPACITOR	
95	1	35794	BUSBAR INPUT BRIDGE/SCR	
96	1	35790	BUSBAR BRIDGE	
97	1	17140310	RESISTOR 2W 10K	R3

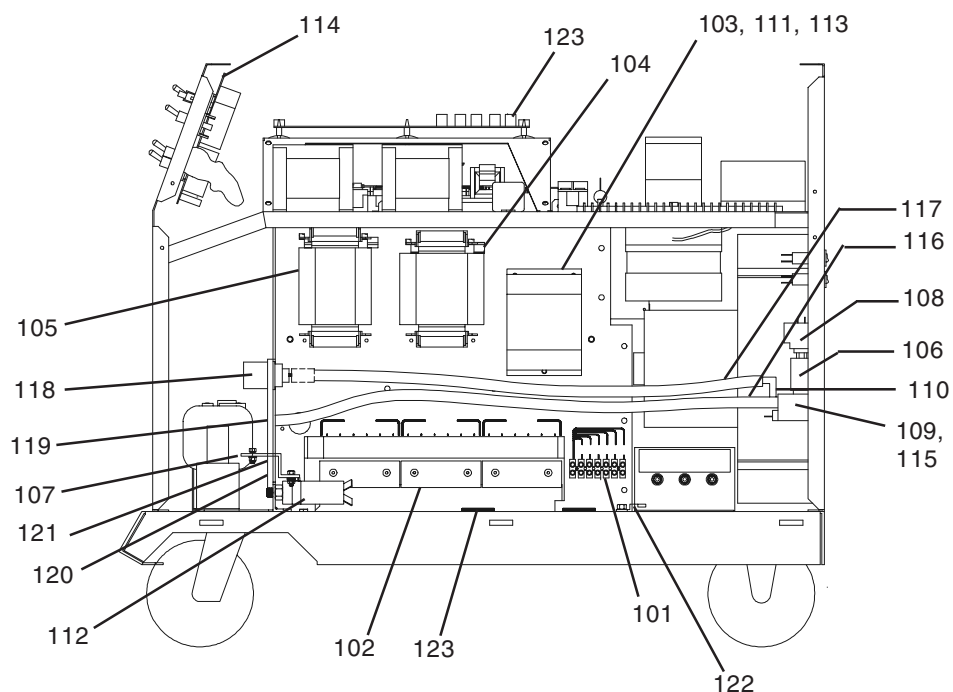


Figure 7-5. ESP-100i Right Side View

ITEM NO.	QTY REQ.	PART NO.	DESCRIPTION	CIRCUIT SYMBOL
101	1	952026	TERMINAL BLOCK, 7 POSITION	TB2
102	1	35682	TRANSFORMER, AUTO	T4
103	1	673502	CONTACTOR, MAIN	K1
104	1	35681	TRANSFORMER ASSEMBLY, MAIN	T3
105	1	35680	INDUCTOR ASSEMBLY, OUTPUT	L2
106	1	35705	MANIFOLD	
107	1	32947	TERMINAL WORK	
108	2	951982	SWITCH, PRESSURE	PS1, 2
109	2	952061	VALVE, SOLENOID GAS	GSV1, 2
110	1	951202	FLOW SWITCH	FS1
111	1	952051	DIODE, ZENER 180V	ZD1
112	1	952043	SWITCH PRESSURE	PS3
113	3	951963	VARISTOR METAL OX., 625V	MOV4, 5, 6
114	1	38048	ISOLATION AMPLIFIER PCB	PCB4
115	1	951471	DIODE ZENER 62V 5W 7.1A	ZD3
116	1	35847	HOSE ASSEMBLY, 24"	
117	1	35846	HOSE ASSEMBLY, 22"	
118	1	634090	ADAPTOR 1/4NPTM x C/A-W F	
119	1	58V58	ADAPTOR 1/4NPTM x B/I-G F	
120	1	32194	BOARD OUTPUT TERMINAL	
121	1	13730583	TERMINAL BUSHING	J5
122	1	647361	GROUND LUG	
123	2	23604891	LABEL WARNING HI VOLTAGE	

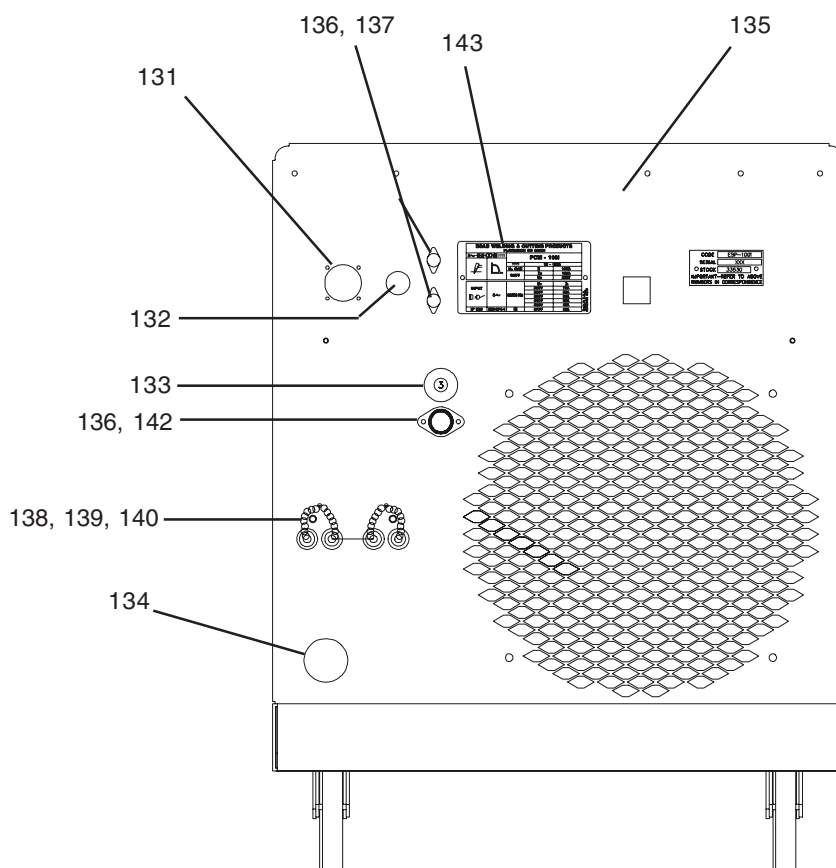


Figure 7-6. ESP-100i Rear View

ITEM NO.	QTY REQ.	PART NO.	DESCRIPTION	CIRCUIT SYMBOL
131	1	2010277	HOUSING, 14-PIN AMPHENOL	J3
132	1	23610197	HOLE PLUG, BLACK	
133	1	950829	CIRCUIT BREAKER, 3A	CB1
134	1	950937	STRAIN RELIEF	
135	1	32196	PANEL, REAR	
136	3	952136	FUSE HOLDER	F1, F2
137	2	952056	FUSE 20A 600V	
138	1	86W40	DUST PLUG - R.H.	F4
139	1	86W41	DUST PLUG - L.H.	
140	2	639582	PLUG & NUT	
142	1	0558005164	FUSE 4A 600VAC TIME DELAY	
143	1	954483	LABEL RATING ESP-100I	

**ESP-100i**  
**PCB 38020 TO 38214 CHANGE-OVER INSTRUCTIONS**

1. DISCONNECT POWER IN TWO PLACES.
2. REMOVE TOP COVER.
3. REMOVE CONTROL PCB AND REPLACE WITH 38214 PCB.

**WARNING**

**FAILURE TO DO STEP 4&5 WILL CAUSE DAMAGE.**

4. ON THE P2 HARNESS CONNECTOR, REMOVE THE WIRE IN P2-5 AND PUT IT IN P2-7.
5. ON THE P2 HARNESS CONNECTOR, REMOVE THE WIRE IN P2-6 AND PUT IT IN P2-8.
6. INSTALL THE 0558001177 IGBT DRIVER BOARDS ON TO THE IGBTs AND PLUG THE CONNECTORS INTO P3 AND P4 ON THE 38214 PCB.
7. REPLACE COVERS AND TEST.

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## NOTES

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## NOTES

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## REVISION HISTORY

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The "A Edition of this manual covers the following changes. Some changes were covered by two Inserts dated March, 1996 and November, 1997.

1. Current ratings were changed to comply with NEMA standards.
2. Using the PT-20AM torch with plumbing box was clarified by adding a connection diagram (Figure 4-5).
3. Pilot Arc High-Low switch (S5) was changed from SPST to 3PST for increased current capacity.
4. Starting with Serial No. PD-I742001, the HF/HV Ignition PC Board, 31490, was replaced by Spark Gas Assembly (SG), 36431, and the High Frequency Reactor (T5), 32969, was replaced by a stronger reactor, 37250, for improved arc starting.
5. Added more replacement parts.

The "B" Edition (8/98) of this manual was printed to cover the change in mechanized cutting from high frequency box and plumbing box system to the arc starter system. This change was previously covered by an Insert dated June, 1998.

The "C" Edition (01/01) of this manual covers the updated safety precautions, components designations, descriptions and changed the IGB thermal pad from 951190 to 951191, part number correction for item 8-page 33, and revised Communication Guide on back page.

The "D" Edition (07/02) of this manual done July, 2002

The "E" Edition (11/04) of this manual changed a fuse part number from 952559 to 0558005164 per CN# 043199.

The "F" Edition (12/07) of this manual changed Section 7, BOM item 57, part number to include 38214 per D. Perkins. Also added " ESP-100i PCB 38020 TO 38214 CHANGE-OVER INSTRUCTIONS" to back of manual.

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